VXC/VEX Cards User's Manual

VXC-112(A)U/112iAU, VXC-142(A)U/142i(A)U,
VXC-182i(A)U, VXC-114U/114iAU, VXC-144U/144iU
VEX-114/114i, VEX-144/144i, VEX-112/112i, VEX-142/142i

Warranty

All products manufactured by ICP DAS are warranted against defective materials for a period of one year from the date of delivery to the original purchaser.

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1. Introduction

The VXC/VEX multi-port serial card enables user to increase additional communication ports on the PC. It's the on-top-of-the-list choice while you are managing to connect lots of outer devices through your PC; every VXC/VEX card ensures you fluent communication in both time-critical applications and industrial fields. With simply a VXC/VEX card, it has never been that easy for integration of a PC with many other devices, like PLCs, FAB machines, meters, controller devices, laboratory instruments, modems, card readers, serial printers, RFID readers, bar code readers, sensors, etc.

COM-Selector:

Each VXC/VEX card is equipped with a COM-Selector (Dip Switch) for the COM port number selection (automatically or manually). It's an important and innovative feature for the VXC/VEX family.

The COM-Selector provides the following advantages:

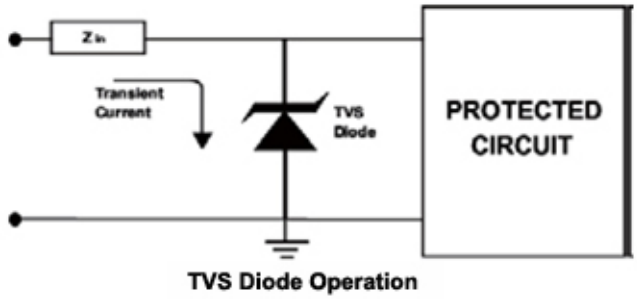
- Simplifies the COM port number selection instead of using configuration utility programs.
- Users can specify the COM port number of the VXC/VEX card as exactly what they want, no matter which PCI slot it is located at.
- Automatically select an available COM port number is supported by setting the COM-Selector (dip switch) to 0 (default).
- No need to install configuration utility and to study its operation for different OS.

Easy COM Port
Selection by Dip-Switch

- Prevents confusion. Other PnP COM port devices easily confuse users because of adopting the dynamic COM port number setting.
- Easy replacement of an existing card by setting the dip-switch to be the same COM port number.
- Great for mass system installation, since setting the dip-switch to be the same COM port number is very easy.

ESD Protection

The VXC/VEX cards offer TVS diode ESD protection technology, protecting your system from being damaged by the high potential voltages.



TVS Diode Operation

Under normal operating conditions, the TVS diode presents high impedance (appears as an open circuit) to the protected component. When the voltage is beyond the limits, the TVS diode avalanches providing a low impedance path for the transient current. As a result, the transient current is diverted away from the protected components and shunted through the TVS diode. The device returns to a high impedance state after the transient threat passes.

Up To 128 Bytes Hardware FIFO:

The VXC/VEX cards offer TVS diode ESD protection technology, protecting your system from being damaged by the high potential voltages.

VXC/VEX Cards are equipped with 16 or 128 bytes hardware FIFO for each port. Large hardware FIFO is useful to prevent data lost when your system works on heavy loading, and even helpful while you are running on a multi-task operating system, such as Windows, Linux…etc.

Up To 128 KB COM Port Buffer:

The VXC/VEX card driver for Windows features a 128 KB maximum software FIFO for each port (default is 4 KB). It's practical for large file transmission.

Self-Tuner:

The VXC/VEX card is equipped with a “Self-Tuner” chip to control the sending/receiving direction of RS-485 ports automatically.

Without the help of Self-Tuner, users need to enable RS-485 transmitter before sending, and disable the transmitter after finishing sending. The timing to enable and disable transmitter (direction control) is the major issue on many communication problems, and it is very difficult to debug.

The built-in Self-Tuner on VXC/VEX cards effectively gets rid of this direction control issue and also simplifies software programming for communication applications.

Isolation:

Some VXC/VEX cards offer photo isolation to protect your computer and equipment against damages in harsh environment.

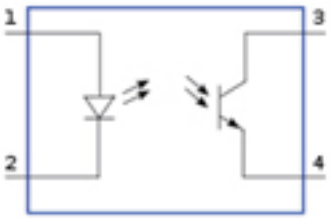


Photo Coupler Operation

Photo coupler is a device that uses a short optical transmission path to transfer a signal between elements of a circuit, typically a transmitter and a receiver. This keeping them electrically isolated — since the signal goes from an electrical signal to an optical signal, the electrical contact along the path is broken.

It can help cutting down on ground loops, common mode voltages and block voltage spikes, provide electrical isolation, and offer significant protection from serious over-voltage conditions in one circuit affecting the other.

Short Card Design:

The “Short Card” design is suitable for compact-sized computer, especially for IPC (Industrial Personal Computer) and servers.

Universal PCI (3.3 V and 5 V):

The Universal PCI card works with both new 3.3 V PCI bus that has been widely-used in servers, and traditional 5 V PCI bus. The universal PCI interface will be the standard for every card from ICP DAS in the near future.

1.1 Features

- Universal PCI V2.2, supports 5 V and 3.3 V PCI bus / PCI Express bus
- COM-Selector
- Provides surge protection
- 128 Byte UART FIFO

1.2 Specifications

	VXC-112(A)U	VXC-112iAU	VXC-182i(A)U	VXC-142(A)U	VXC-142i(A)U	VXC-144U	VXC-144iU	VXC-114U	VXC-114iAU
Bus	Universal PCI (5 V and 3.3 V)								
Connector	Male DB-9					Female DB-37			
RS-232	**2-ports**	**2-ports**	**1-ports**	**-**	**-**	**-**	**-**	**4-ports**	**4-ports**
RS-422/485	**-**	**-**	**1-ports**	**2-ports**	**2-ports**	**4-ports**	**4-ports**	**-**	**-**
Self-tuner or equivalence design	**-**	**-**	**Yes (COM1)**	**Yes**	**Yes**	**Yes**	**Yes**	**-**	**-**
Isolation	**-**	**2.5 kV**	**2.5 kV**	**-**	**2.5 kV**	**-**	**2.5 kV**	**-**	**2.5 kV**
COM-Selector	**Yes**								
UART	16C950 Compatible								
Baud rate	50 ~ 115200 bps								
Data bits	5, 6, 7, 8								
Parity Bit	None, Even, Odd, Mark, Space								
Stop Bits	1, 1.5, 2								
FIFO size	128 Bytes								
Operating Temperature	0 ~ 50 ^{o}C								
Storage Temperature	-20 ~ 70 ^{o}C								
Humidity	0 ~ 90 % non-condensing								
Dimensions (mm)	130 X105	130 X105	130 X105	130 X105	130 X105	129 X83	129 X83	129 X83	129 X83

	VEX-144	VEX-144i	VEX-114	VEX-114i	VEX-142	VEX-142i	VEX-112	VEX-112i
Bus	PCI Express							
Connector	Female DB-37				Male DB-9			
RS-232	-	-	4-ports	4-ports	-	-	2-ports	2-ports
RS-422/485	4-ports	4-ports	-	-	2-ports	2-ports	-	-
Self-tuner or equivalence design	**Yes**	**Yes**	-	-	-	-	-	-
Isolation	-	**2.5 kV**	-	**2.5 kV**	-	**2.5 kV**	-	**2.5 kV**
COM-Selector	**Yes**							
UART	16C950 Compatible							
Baud rate	50 ~ 115200 bps							
Data bits	5, 6, 7, 8							
Parity Bit	None, Even, Odd, Mark, Space							
Stop Bits	1, 1.5, 2							
FIFO size	128 Bytes							
Operating Temperature	0 ~ 50 ^{o}C							
Storage Temperature	-20 ~ 70 ^{o}C							
Humidity	0 ~ 90 % non-condensing							
Dimensions (mm)	114 X101	114 X101	110 X110	110 X110	110X94	110X94	110X94	110X94

1.3 Product Check List

The package includes the following items:

- One VXC/VEX series card
- One ICP DAS software CD
- One Quick Start

It is recommended that you read the Quick Start to see the software driver location first.

Attention!

If any of these items are missing or damaged, contact the dealer from whom you purchased the product. Save all shipping materials and the carton in case you need to ship or store the product in the future.

1.4 Ordering Information

Model	Description
VEX-112	PCI Express, 2-port RS-232 communication board
VEX-112i	PCI Express, 2-port **I**solated RS-232 communication board
VEX-142	PCI Express, 2-port RS-422/485 communication board
VEX-142i	PCI Express, 2-port **I**solated RS-232 communication board
VEX-114	PCI Express, 4-port RS-232 communication board
VEX-114i	PCI Express, 4-port **I**solated RS-232 communication board
VEX-144	PCI Express, 4-port RS-422/485 communication board
VEX-144i	PCI Express, 4-port **I**solated RS-422/485 communication board
VXC-112(A)U	Universal PCI, 2-port RS-232 communication board
VXC-112iAU	Universal PCI, 2-port **I**solated RS-232 communication board
VXC-114U	Universal PCI, 4-port RS-232 communication board
VXC-114iAU	Universal PCI, 4-port **I**solated RS-232 communication board
VXC-142(A)U	Universal PCI, 2-port RS-422/485 communication board
VXC-142i(A)U	Universal PCI, 2-port **I**solated RS-422/485 communication board
VXC-144U	Universal PCI, 4-port RS-422/485 communication board
VXC-144iU	Universal PCI, 4-port **I**solated RS-422/485 communication board
VXC-182i(A)U	Universal PCI, 1-port **I**solated RS-422/485 and 1-port RS-232 communication board

1.5 Options

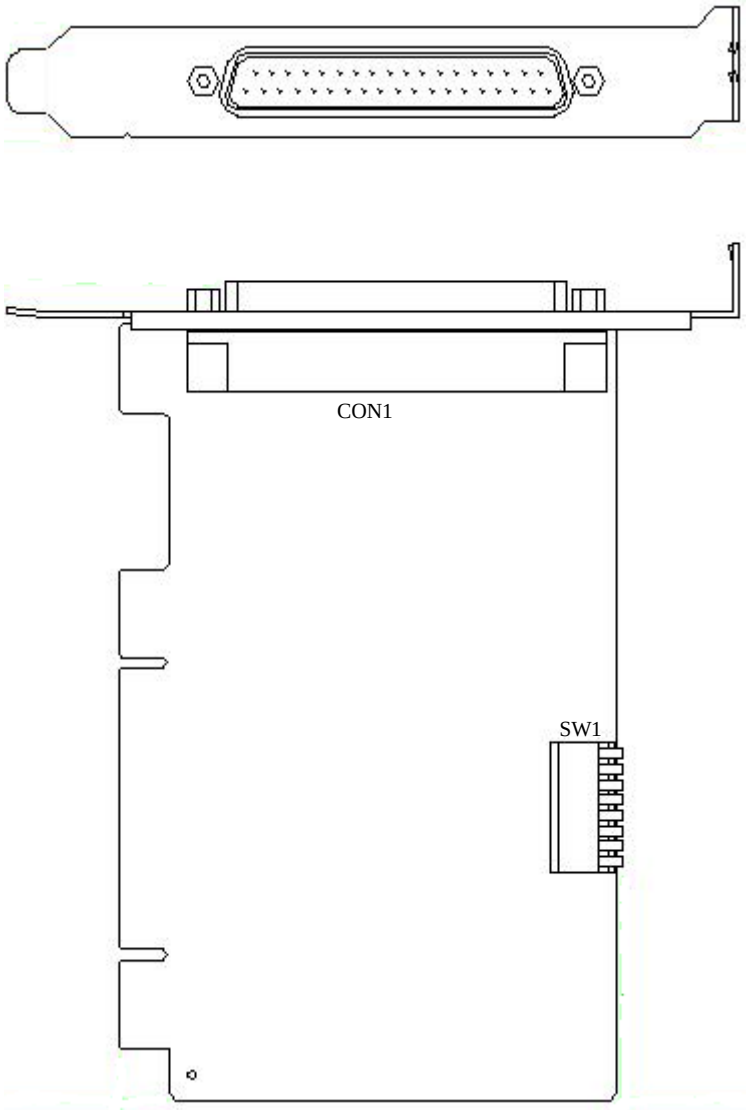
Item	Description	VXC-112(A)U /112iAU	VXC-182i(A)U	VXC-142(i)(A)U	VEX-112/VEX-112i	VEX-142/VEX-142i
CA-PC09F	9-pin Female D-sub connector with plastic cover	✓	✓	✓	✓	✓
DN-09-2/ DN-09-2F	I/O Connector Block with DIN-Rail Mounting and two 9-Pin male Header	✓	✓	✓	✓	✓
CA-0910F	9-pin Female-Female D-sub cable, 1 M	✓	✓	✓	✓	✓
CA-0910N	9-pin Female-Female D-sub cable, 1 M Null Modem Cable	✓	✓	✓	-	-
CA-0915	9-pin Male-Female D-sub cable, 1.5M	✓	✓	✓	✓	✓
CA-090910	9-pin Female D-sub & (9-wire) RS-422 Cable, 1 M	-	✓	✓	-	✓
CA-0903	9-pin Female D-sub & 5-wire RS-232 cable, 30 cm	✓	✓	-	-	-
CA-0910	9-pin Female D-sub & 3-wire RS-232 cable, 1 M	✓	✓	-	-	-

Item	Description	VXC-114(iA)U VEX-114(i)	VXC-144(i)U VEX-144(i)
CA-4002 	37-pin Male D-sub connector with plastic cover	✓	✓
DN-37 	I/O Connector Block (Pitch= 5.08 mm) with DIN-Rail Mounting Include: One CA-3710 (37-pin Male-Male D-sub cable 1.0 M)	✓	✓
CA-3710 	37-Pin Male-Male D-sub cable 1 M (45º)	✓	✓
CA-3710D 	37-Pin Male-Male D-sub cable 1M (180º)	✓	✓
CA-3720 	DB-37 Male-Male D-sub cable 2 M Cable(45 º)	✓	✓
CA-3720D 	37-Pin Male-Male D-sub cable 2 M (180º)	✓	✓
CA-9-3715D 	DB-37 Male(D-sub) to 4-Port DB-9 Male(D-sub) cable 1.5 M (180 º)	✓	✓

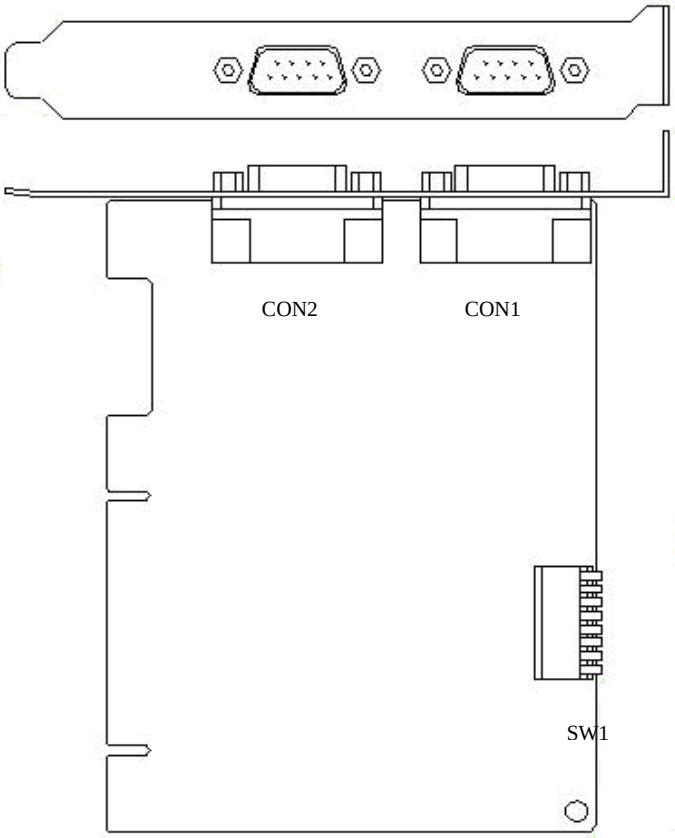
2.Hardware configuration

2.1 Board Layout

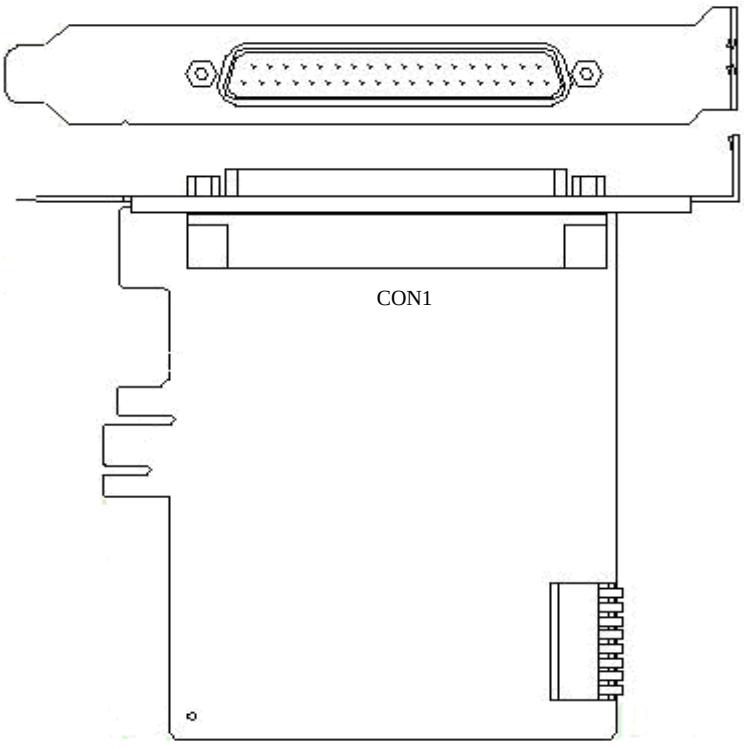
- Board layout of the VXC-114U/114iAU/144U/144iU



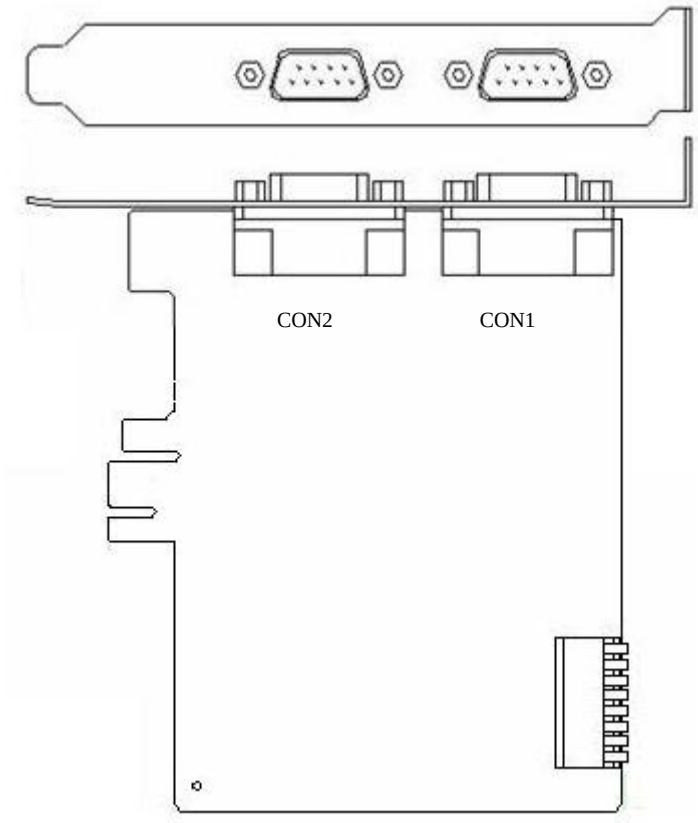
- Board layout of the VXC-112(A)U/112iAU/142(A)U/142i(A)U/182i(A)U



- Board layout of the VEX-114/114i/144/144i



- Board layout of the VEX-112/112i/142/142i



2.2 COM Port Mapping and Board ID

The Board ID and COM port mapping are the same, which is set by the SW1 DIP switch. The SW1 DIP switch has different functions under different OS.

For **DOS** users, the SW1 DIP switch acts as **Board ID**. When there are two or more multi-port serial cards in a single system, it is difficult to identify individual card number. For easier identification, the VXC/VEX series card includes a Board ID function.

For **Windows** users, the SW1 DIP switch acts as **COM port number selector** and the COM port number is depending on the Board ID. If the Board ID is 0, then the driver finds a valid number for each port. If the Board ID is not 0, then the driver uses the "**Board ID**" to be the first COM port number and uses the "**Board ID +1**" to be the next COM port number and so on.

Note:

It's recommended to select a unique COM port number (Board ID) by users. This helps users to clear identify and fix the card-number and port-number in a system.

Warning:

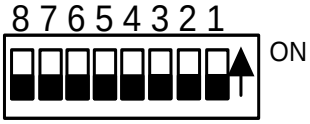
The port will not work if the COM port number is conflicted under Windows or Linux system. In that case, users should try other COM port numbers.

Usually, the COM1 and COM2 are reserved by systems. And it's recommended to reserve the COM3 and COM4 if you will have other Plug&Play serial ports in the future. This prevents conflict.

For **Linux** users, it's the same as Windows users but for **TTY device number selector**.

The configuration examples are as follows.

SW1

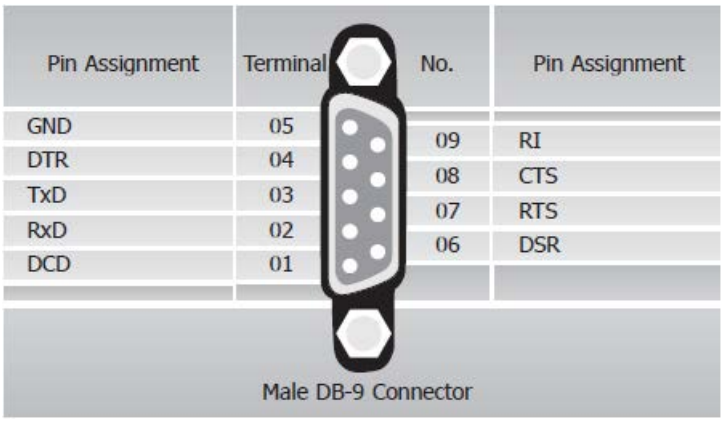


SW1 DIP Switch	8	7	6	5	4	3	2	1
Board ID=**0x00** (**Default**) COM = Auto-defined	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Board ID=**0x03** COM = 3/4/5/6	OFF	OFF	OFF	OFF	OFF	OFF	**ON**	**ON**
Board ID=**0x05** COM = 5/6/7/8	OFF	OFF	OFF	OFF	OFF	**ON**	OFF	**ON**
Board ID=**0x07** COM = 7/8/9/10	OFF	OFF	OFF	OFF	OFF	**ON**	**ON**	**ON**
Board ID=**0x09** COM = 9/10/11/12	OFF	OFF	OFF	OFF	**ON**	OFF	OFF	**ON**
Board ID=**0x14** COM = 20/21/22/23	OFF	OFF	OFF	**ON**	OFF	**ON**	OFF	OFF
Board ID=**0x1E** COM = 30/31/32/33	OFF	OFF	OFF	**ON**	**ON**	**ON**	**ON**	OFF
Board ID=**0x28** COM = 40/41/42/43	OFF	OFF	**ON**	OFF	**ON**	OFF	OFF	OFF
Board ID=**0x32** COM = 50/51/52/53	OFF	OFF	**ON**	**ON**	OFF	OFF	**ON**	OFF
Board ID=**0x3C** COM = 60/61/62/63	OFF	OFF	**ON**	**ON**	**ON**	**ON**	OFF	OFF
Board ID=**0x64** COM = 100/101/102/103	OFF	**ON**	**ON**	OFF	OFF	**ON**	OFF	OFF
Board ID=**0x96** COM = 150/151/152/153	**ON**	OFF	OFF	**ON**	OFF	**ON**	**ON**	OFF
Board ID=**0xC8** COM = 200/201/202/203	**ON**	**ON**	OFF	OFF	**ON**	OFF	OFF	OFF
. . .								
Board ID=**0xFF** COM = 255/256/x/x	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**

Note: If multi-port serial board is 2-port VXC card the COM number is the first two numbers.

2.3 Pin Assignment

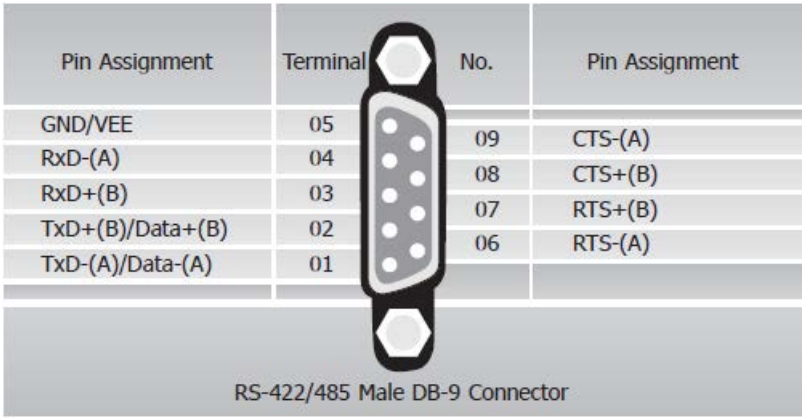
2.3.1 VXC-112(A)U/VXC-112iAU/VEX-112(i) Pin Assignment



RS-232 Cable Wiring (Null Modem)

System1	Pin		Pin	System2
RxD	2	←	3	TxD
TxD	3	→	2	RxD
GND	5	↔	5	GND
DTR	4	→	6	DSR
	--		1	DCD
DCD	1		--	
DSR	6	←	4	DTR
RTS	7	→	8	CTS
CTS	8	←	7	RTS
RI	9	←	9	RI

2.3.2. VXC-142(i)(A)U/VEX-142(i) Pin Assignment



RS-422 Cable Wiring

VXC.COM	Pin No.		Pin No.	VXC.COM
TxD-	1	→	4	RxD-
TxD+	2	→	3	RxD+
RxD+	3	←	2	TxD+
RxD-	4	←	1	TxD-
GND	5	↔	5	GND
RTS-	6	→	9	CTS-
RTS+	7	→	8	CTS+
CTS+	8	←	7	RTS+
CTS-	9	←	6	RTS-

Warning:

The RS-485 bus is a differential (balanced) signal, thus **you cannot wire the Data+ with Data- directly for a single port loop-back test.** It will not work at all!

RS-485 Cable Wiring

VXC.COM	Pin No.		Pin No.	VXC.COM
DATA-	1	↔	1	DATA-
DATA+	2	↔	2	DATA+

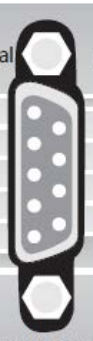
2.3.3. VXC-114(iA)U/VEX-114(i) Pin Assignment

Pin Assignment	Terminal No.	Pin Assignment
N.C.	01	
DCD3	02	
GND	03	
CTS3	04	
RxD3	05	
RI4	06	
DTR4	07	
DSR4	08	
RTS4	09	
TxD4	10	
DCD2	11	
GND	12	
CTS2	13	
RxD2	14	
RI1	15	
DTR1	16	
DSR1	17	
RTS1	18	
TxD1	19	
	20	RI3
	21	DTR3
	22	DSR3
	23	RTS3
	24	TxD3
	25	DCD4
	26	GND
	27	CTS4
	28	RxD4
	29	RI2
	30	DTR2
	31	DSR2
	32	RTS2
	33	TxD2
	34	DCD1
	35	GND
	36	CTS1
	37	RxD1

RS-232 Female DB-37 Connector

DB-37 to 4-port DB-9 (CA-9-3715D)

Pin Assignment	Terminal No.	Pin Assignment
GND	05	
DTR	04	
TxD	03	
RxD	02	
DCD	01	
	09	RI
	08	CTS
	07	RTS
	06	DSR



Male DB-9 Connector

RS-232 Cable Wiring (Null Modem)

System1	Pin		Pin	System2
RxD	2	←	3	TxD
TxD	3	→	2	RxD
GND	5	↔	5	GND
DTR	4	→	6	DSR
	--		1	DCD
DCD	1		--	
DSR	6	←	4	DTR
RTS	7	→	8	CTS
CTS	8	←	7	RTS
RI	9	←	9	RI

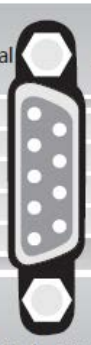
2.3.4. VXC-144(i)U/VEX-144(i) Pin Assignment

Pin Assignment	Terminal No.		Pin Assignment
N.C.	01	20	CTS3-(A)
TxD3-(A)/Data3-(A)	02	21	RxD3-(A)
GND/VEE3	03	22	RTS3-(A)
CTS3+(B)	04	23	RTS3+(B)
TxD3+(B)/Data3+(B)	05	24	RxD3+(B)
CTS4-(A)	06	25	TxD4-(A)/Data4-(A)
RxD4-(A)	07	26	GND/VEE4
RTS4-(A)	08	27	CTS4+(B)
RTS4+(B)	09	28	TxD4+(B)/Data+(B)
RxD4+(B)	10	29	CTS2-(A)
TxD2-(A)/Data2-(A)	11	30	RxD2-(A)
GND/VEE2	12	31	RTS2-(A)
CTS2+(B)	13	32	RTS2+(B)
TxD2+(B)/Data2+(B)	14	33	RxD2+(B)
CTS1-(A)	15	34	TxD1-(A)/Data1-(A)
RxD1-(A)	16	35	GND/VEE1
RTS1-(A)	17	36	CTS1+(B)
RTS1+(B)	18	37	TxD1+(B)/Data1+(B)
RxD1+(B)	19		

RS-422/485 Female DB-37 Connector

DB-37 to 4-port DB-9 (CA-9-3715D)

Pin Assignment	Terminal No.		Pin Assignment
GND/VEE	05	09	CTS-(A)
RxD-(A)	04	08	CTS+(B)
RxD+(B)	03	07	RTS+(B)
TxD+(B)/Data+(B)	02	06	RTS-(A)
TxD-(A)/Data-(A)	01		



RS-422/485 Male DB-9 Connector

RS-422 Cable Wiring

VXC.COM	Pin No.		Pin No.	VXC.COM
TxD-	1	→	4	RxD-
TxD+	2	→	3	RxD+
RxD+	3	←	2	TxD+
RxD-	4	←	1	TxD-
GND	5	↔	5	GND
RTS-	6	→	9	CTS-
RTS+	7	→	8	CTS+
CTS+	8	←	7	RTS+
CTS-	9	←	6	RTS-

Warning:

The RS-485 bus is a differential (balanced) signal, thus **you cannot wire the Data+ with Data- directly for a single port loop-back test.** It will not work at all!

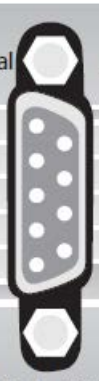
RS-485 Cable Wiring

VXC.COM	Pin No.		Pin No.	VXC.COM
DATA-	1	↔	1	DATA-
DATA+	2	↔	2	DATA+

2.3.5. VXC-182i(A)U Pin Assignment

CN1: Isolation RS-422/485 port

Pin Assignment	Terminal No.		Pin Assignment
GND/VEE	05	09	CTS-(A)
RxD-(A)	04	08	CTS+(B)
RxD+(B)	03	07	RTS+(B)
TxD+(B)/Data+(B)	02	06	RTS-(A)
TxD-(A)/Data-(A)	01		



RS-422/485 Male DB-9 Connector

RS-422 Cable Wiring

VXC.COM	Pin No.		Pin No.	VXC.COM
TxD-	1	→	4	RxD-
TxD+	2	→	3	RxD+
RxD+	3	←	2	TxD+
RxD-	4	←	1	TxD-
GND	5	↔	5	GND
RTS-	6	→	9	CTS-
RTS+	7	→	8	CTS+
CTS+	8	←	7	RTS+
CTS-	9	←	6	RTS-

Warning:

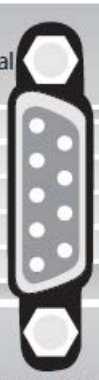
The RS-485 bus is a differential (balanced) signal, thus **you cannot wire the Data+ with Data- directly for a single port loop-back test.** It will not work at all!

RS-485 Cable Wiring

VXC.COM	Pin No.		Pin No.	VXC.COM
DATA-	1	↔	1	DATA-
DATA+	2	↔	2	DATA+

CN2: RS-232 port

Pin Assignment	Terminal No.		Pin Assignment
GND	05	09	RI
DTR	04	08	CTS
TxD	03	07	RTS
RxD	02	06	DSR
DCD	01		



Male DB-9 Connector

RS-232 Cable Wiring (Null Modem)

System1	Pin		Pin	System2
RxD	2	←	3	TxD
TxD	3	→	2	RxD
GND	5	↔	5	GND
DTR	4	→	6	DSR
	--		1	DCD
DCD	1		--	
DSR	6	←	4	DTR
RTS	7	→	8	CTS
CTS	8	←	7	RTS
RI	9	←	9	RI

2.4 Hardware Installation

Warning:

Static electricity can easily damage computer equipment. Ground yourself by touching the chassis of the computer before touching any boards.

To install your VXC/VEX series cards, complete the following steps:

1. Refer to Chapter 3 for installing driver first
2. Shut down and power off your computer
3. Remove all covers from the computer
4. Select an empty PCI slot
5. Remove the PCI slot cover from the PC
6. Carefully insert your VXC/VEX card into the PCI slot
7. Attach the cable to the connector
8. Replace the PC cover
9. Power on the computer

Note:

It's recommended to install driver first, since some OS (operating system such as Windows 2000) may ask you to restart the computer again after driver installation. This reduces the times to restart the computer.

3. Software Installation

ICP DAS provides following device drivers for most operation systems such as Windows NT 4.0 and Windows 2000/XP/2003/2008/Vista32/Windows 7 (32 / 64 bits). These Windows drivers provide full interrupt-driven, buffered I/O for each COM ports. And also supports the Plug & Play mechanism for easy installation.

VxCard_W7_v2.08.00.exe:
This is the VXC/VEX Card driver for Windows NT 4.0, 2000/XP/2003/2008/ Vista32 and Windows 7 (32 / 64 bits).

> **Note:**
> Please refer to "**Quick Start**" for getting the location of setup program on CD.

For Windows users to access COM ports, please refer to the "**Serial Communications in Win32**" article for programming information. It can be found by searching on the http://msdn.microsoft.com.

This chapter shows you the detail steps to install these drivers.

> **Note:**
> For more information about COM port number selection, please refer to **Section 2.2 "COM Port Mapping & Board ID"**.

3.1 Windows NT 4.0

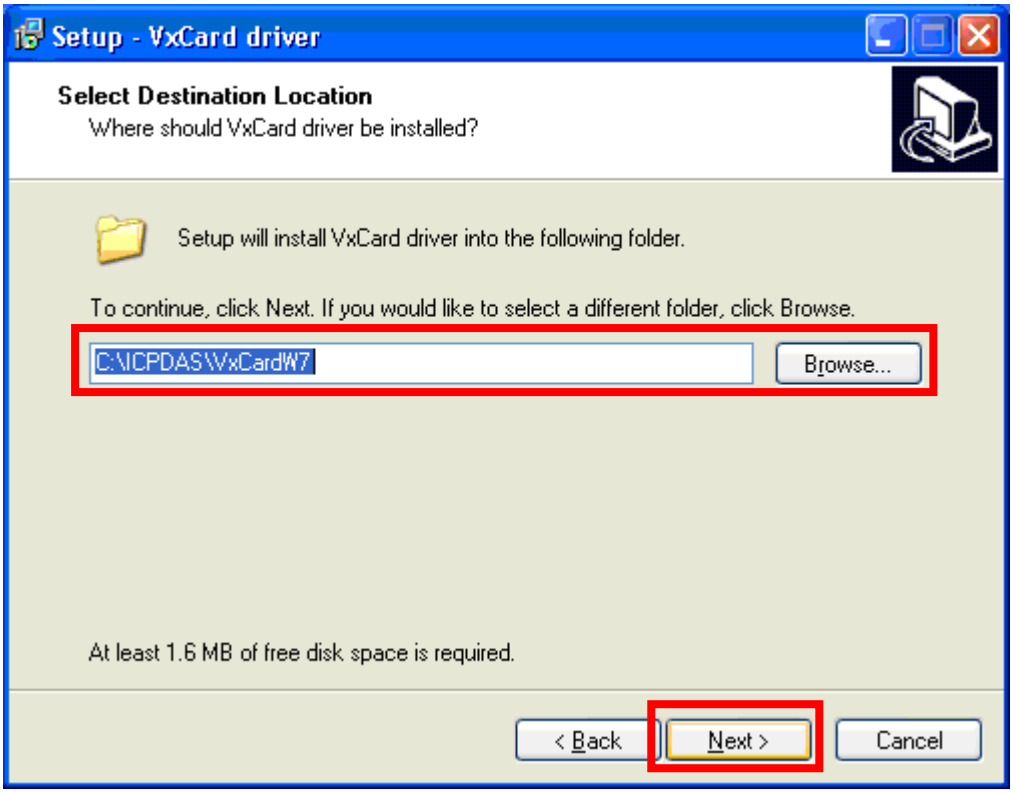
3.1.1 Installation

Note:
It's recommended to install the software first, and then the hardware. This reduces the configuration procedures.
Refer to "**Quick Start**" for getting the location of setup program on CD.

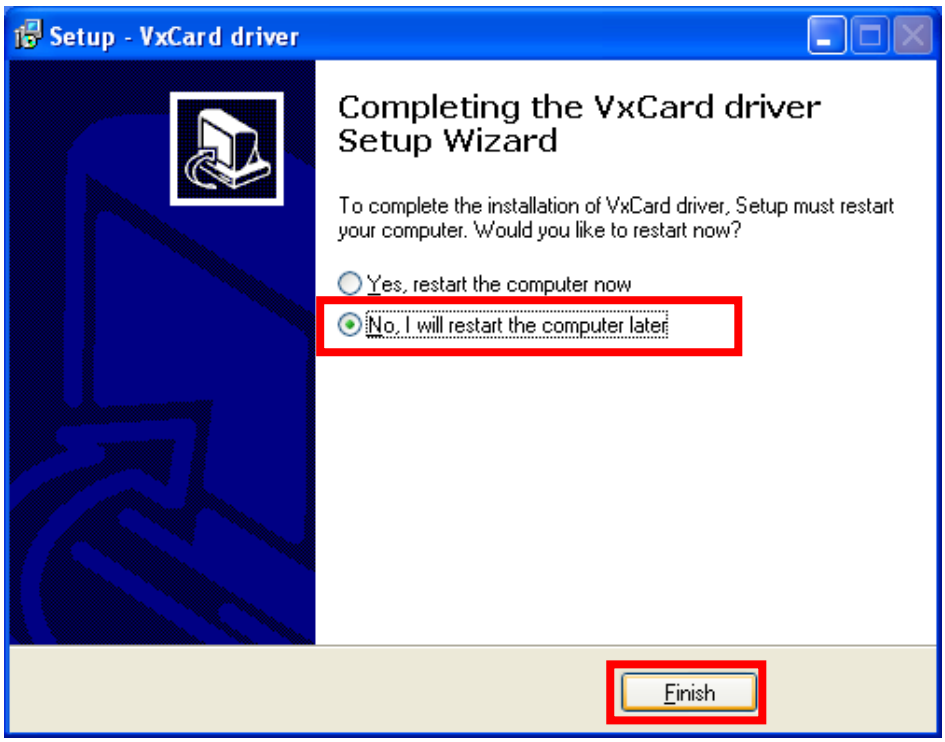
1. Launch the "**VxCard_W7_v2.08.00.exe**" setup program.

2. Click the "**Next >**" button to start installation.

3. Select a folder where setup will install files, and click "**Next>**" button.


Setup - VxCard driver
Select Destination Location
Where should VxCard driver be installed?
Setup will install VxCard driver into the following folder.
To continue, click Next. If you would like to select a different folder, click Browse.
C:\ICPDAS\VxCardW7
Browse...
At least 1.6 MB of free disk space is required.
< Back
Next >
Cancel

4. Select "**No, I will restart the computer later**" and click "**Finish**" button.


Setup - VxCard driver
Completing the VxCard driver Setup Wizard
To complete the installation of VxCard driver, Setup must restart your computer. Would you like to restart now?
Yes, restart the computer now
No, I will restart the computer later
Finish

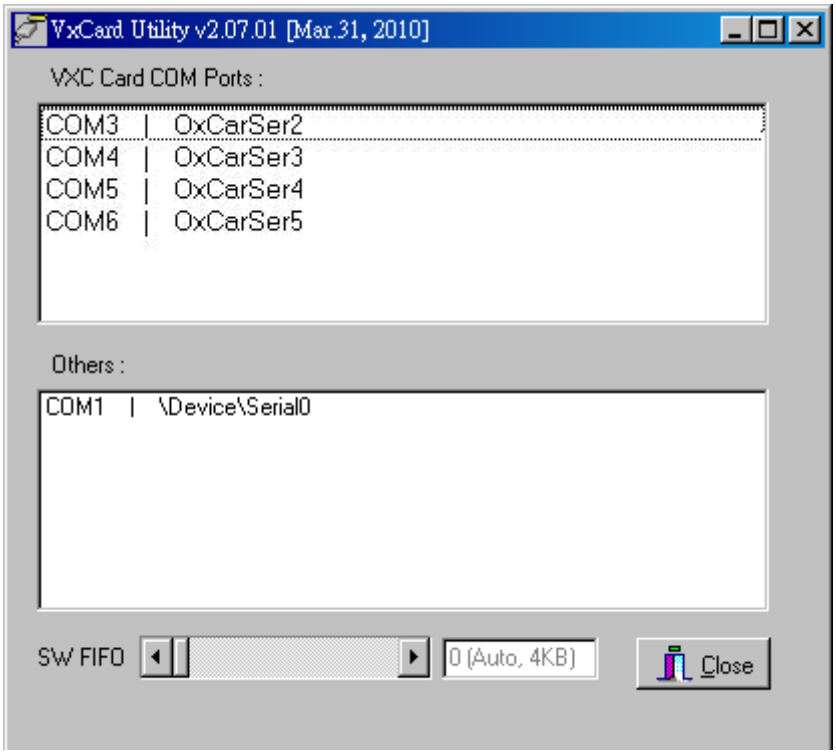
5. Turn off the computer and install the VXC/VEX card into the PC.

6. Power on the computer.

3.1.2 Verification

ICP DAS provides a "**VxCard Util**" program (VxCard Utility.exe) for users to see all the COM ports on the system. It shows COM ports in two gorups, one for VXC/VEX Card and one for others. So, users can check if any conflict occurred between COM ports.

To launch the utility, just double-click on the "**VxCard Utility**" short-cut on your desktop.



3.1.3 Configuration

If need, users can change the input buffer size (default is 4 KB for each port, up to 128 KB) by setting the "SW FIFO" scroll-bar on the VxCard Utility.

To change the COM port mappings (see **Section 2.2 COM Port Mappings and Board ID**), users should restart the driver by rebooting the computer.

3.2 Windows 2000

3.2.1 Installation

Note:

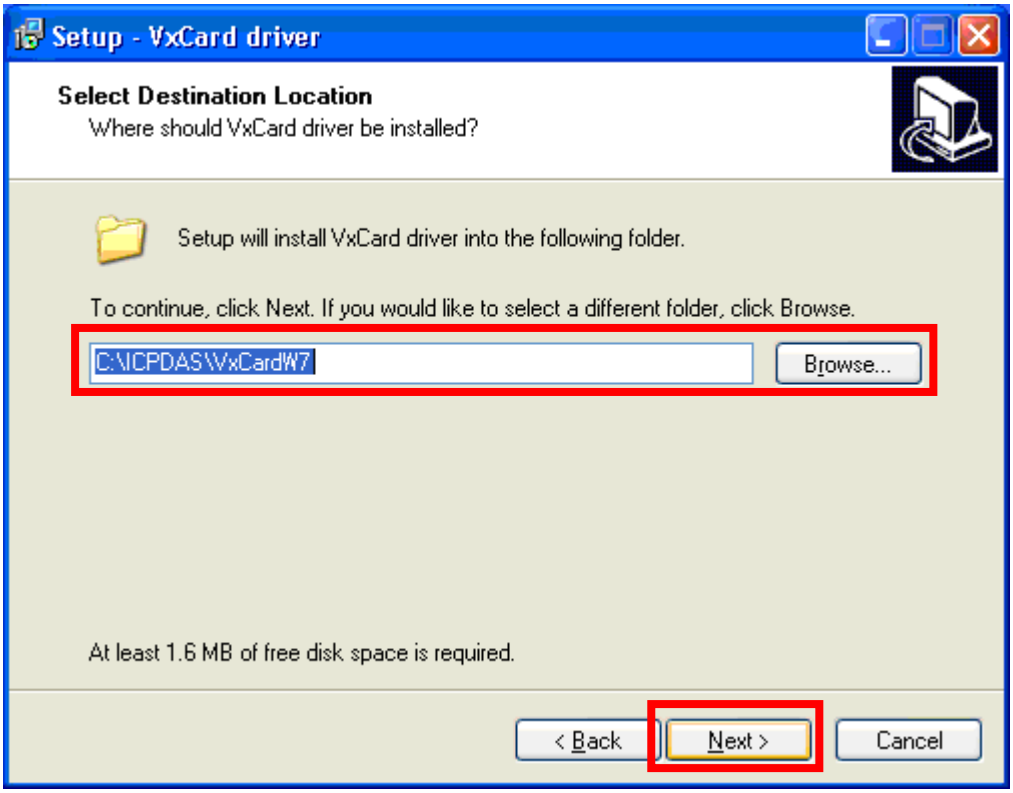
It's recommended to install the software first, and then the hardware. This reduces the configuration procedures.

Refer to "**Quick Start**" for getting the location of setup program on CD.

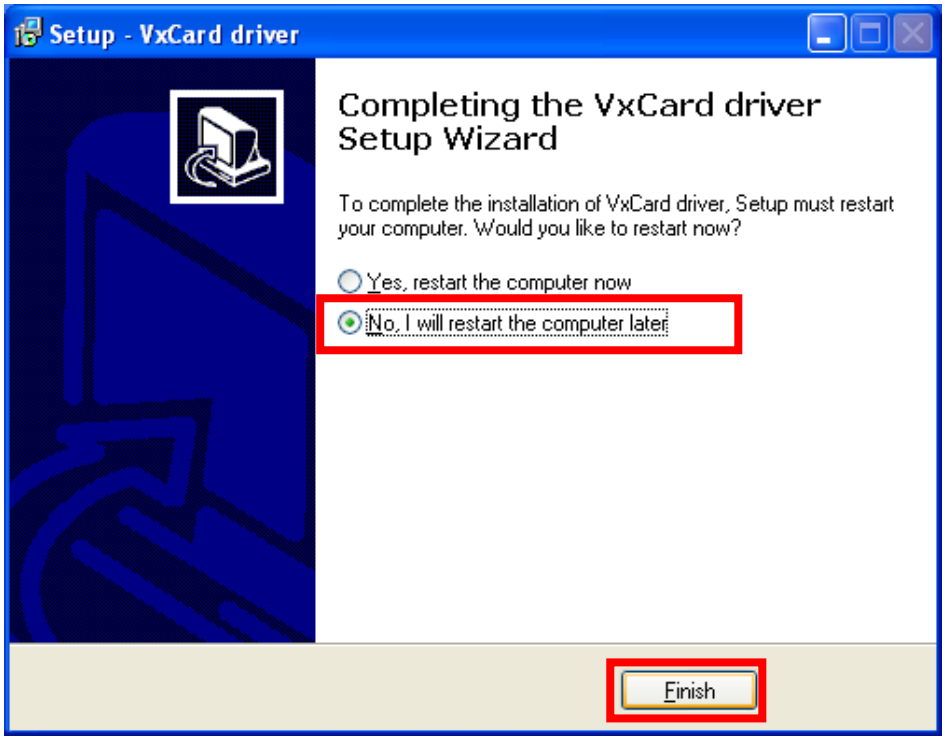
1. Launch the **VxCard_W7_v2.08.00.exe** to install the driver and register the related information onto the system.

2. Click "**Next>**" button to start installation.

3. Select a folder where setup will install files, and click "**Next>**" button.


Setup - VxCard driver
Select Destination Location
Where should VxCard driver be installed?
Setup will install VxCard driver into the following folder.
To continue, click Next. If you would like to select a different folder, click Browse.
C:\ICPDAS\VxCardW7
Browse...
At least 1.6 MB of free disk space is required.
< Back
Next >
Cancel

4. Select “**No, I will restart the computer later**” and click “**Finish**” button.


Setup - VxCard driver
Completing the VxCard driver Setup Wizard
To complete the installation of VxCard driver, Setup must restart your computer. Would you like to restart now?
Yes, restart the computer now
No, I will restart the computer later
Finish

5. Turn off the computer and install the VXC/VEX card into the PC.

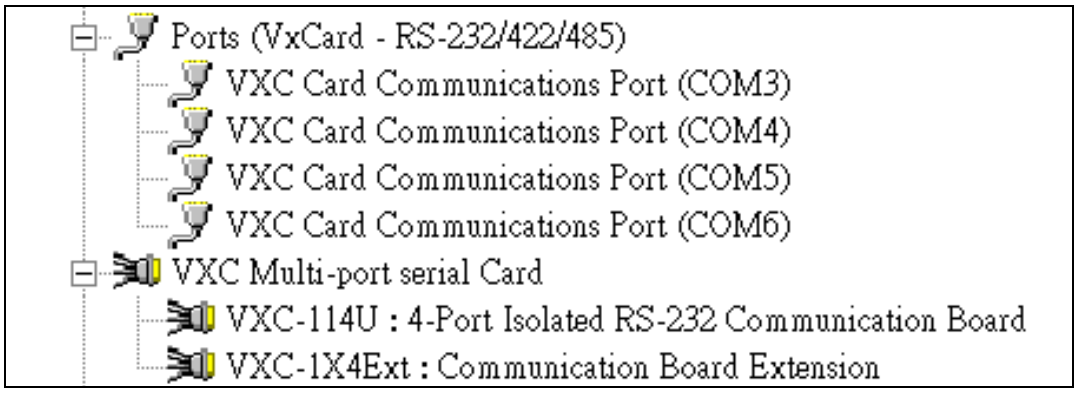
6. Power on the computer, Windows 2000 should find the new card and load the driver automatically. (Sometimes Win2K pops up few confirm dialog box, just click “next” or “OK” to finish it.)

3.2.2 Verification

To verify the installation, please complete the following steps:

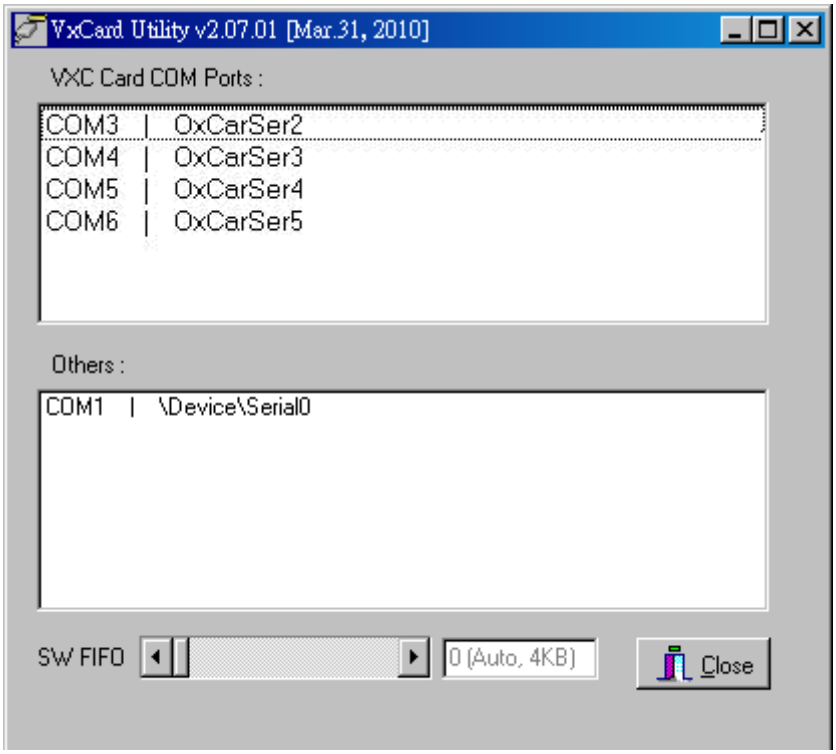
1. Select "**Start / Settings / Control Panel**" and double-click the "**System**" icon.
2. Click the "**Hardware**" tab and then click the "**Device Manager**" button.

The VXC/VEX Card is listed under the "**VXC Multi-port serial Card**" class, and each Communications Port is listed under the "**Ports (VxCard – RS-232/422/485)**" class.


Ports (VxCard - RS-232/422/485)
VXC Card Communications Port (COM3)
VXC Card Communications Port (COM4)
VXC Card Communications Port (COM5)
VXC Card Communications Port (COM6)
VXC Multi-port serial Card
VXC-114U : 4-Port Isolated RS-232 Communication Board
VXC-1X4Ext : Communication Board Extension

3.2.3 Configuration

If needed, users can change the input buffer size (default is 4 KB for each port, up to 128 KB) by setting the “SW FIFO” scroll-bar on the VxCard Utility. The utility’s short cut is placed on the desktop after installation.



To change the COM port mappings (see **Section 2.2 COM Port Mappings and Board ID**), users should restart the driver by rebooting the computer, or re-install the “**VXC/VEX Card**” hardware in the “**Device Manager**” by un-install card and then scan new hardware.

3.2.4 Uninstallation

Before removing the card from your computer, it’s recommended to uninstall the device from the ”**Device Manager**”. This removes unused hardware information from the database (registry) of Windows.

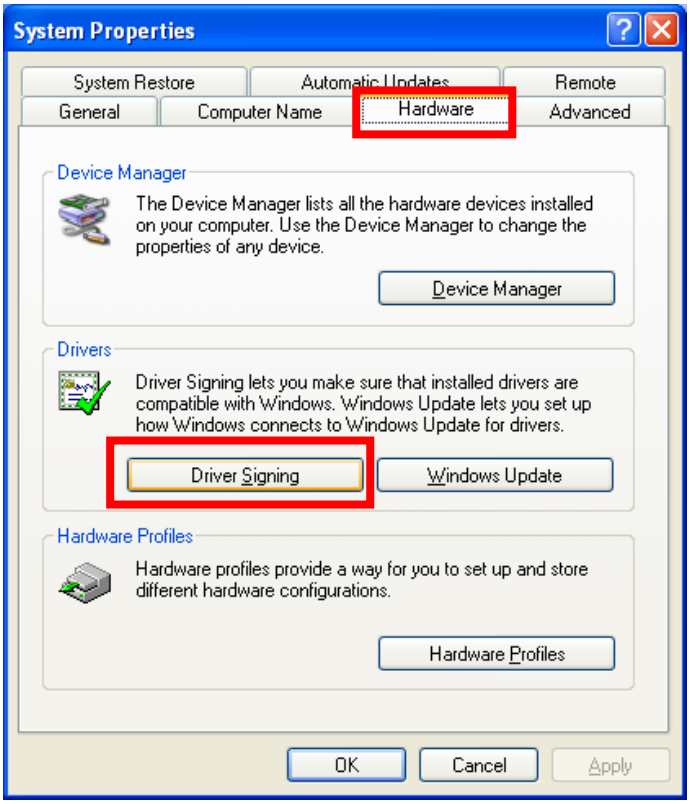
3.3 Windows XP/2003/2008

It's recommend to disable the **Driver Signing** and **Windows Update** options in Windows to suppress the lots of prompt messages during driver installation.

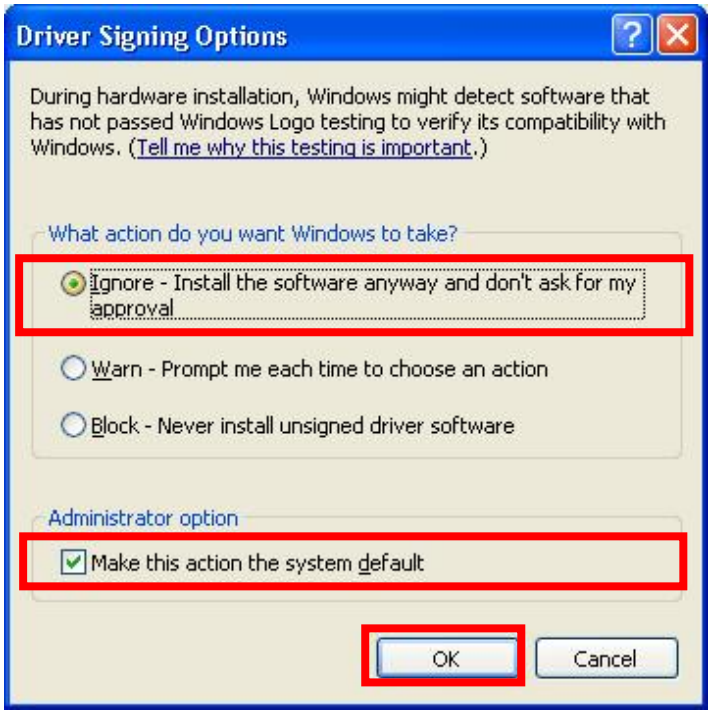
3.3.1 Disable Driver Signing

1. Select "**Start / Settings / Control Panel**" and then "**System**".

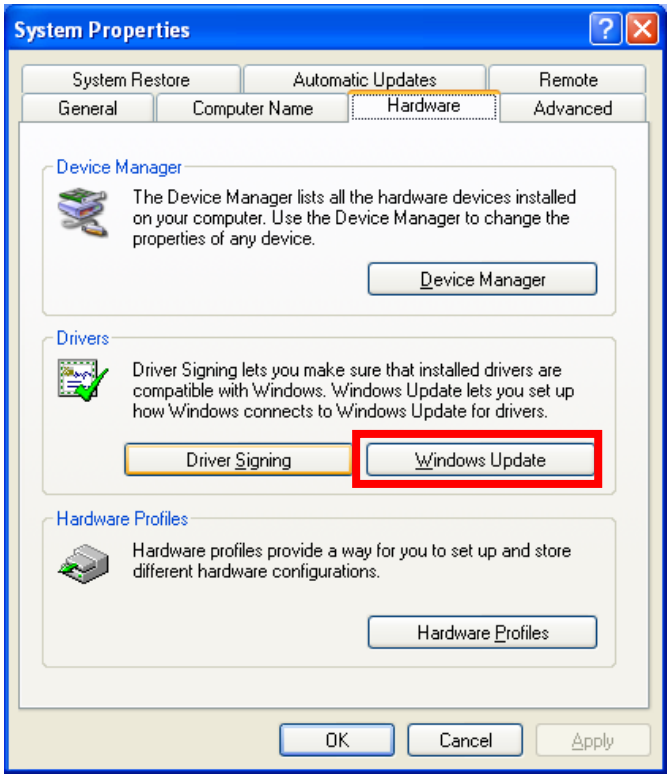
2. Select the "**Hardware**" page on "**System Properties**" window and click the "**Driver Signing**" button.


System Properties
System Restore
Automatic Updates
Remote
General
Computer Name
Hardware
Advanced
Device Manager
The Device Manager lists all the hardware devices installed on your computer. Use the Device Manager to change the properties of any device.
Device Manager
Drivers
Driver Signing lets you make sure that installed drivers are compatible with Windows. Windows Update lets you set up how Windows connects to Windows Update for drivers.
Driver Signing
Windows Update
Hardware Profiles
Hardware profiles provide a way for you to set up and store different hardware configurations.
Hardware Profiles
OK
Cancel
Apply

3. Select "**Ignore – Install the software anyway and don't ask for my approval**", check "**Make this action the system default**" and then click "**OK**" to close the "**Driver Signing Options**" window.


Driver Signing Options
During hardware installation, Windows might detect software that has not passed Windows Logo testing to verify its compatibility with Windows. (Tell me why this testing is important.)
What action do you want Windows to take?
Ignore - Install the software anyway and don't ask for my approval
Warn - Prompt me each time to choose an action
Block - Never install unsigned driver software
Administrator option
Make this action the system default
OK
Cancel

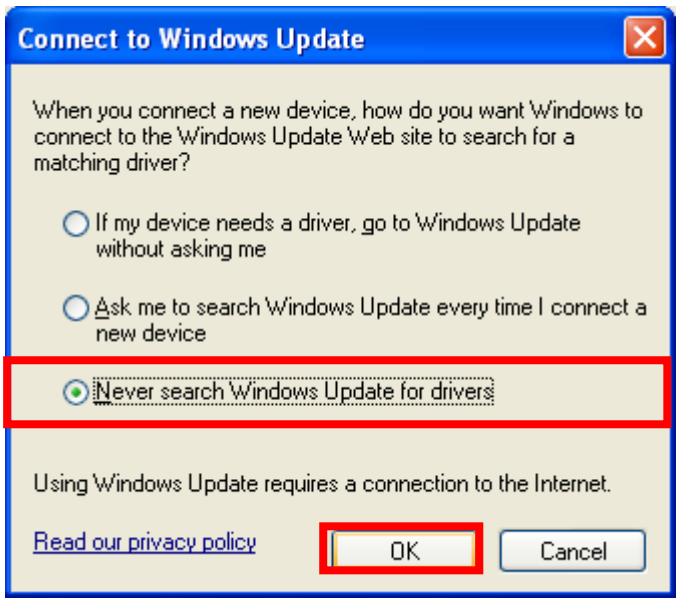
4. Click the "**Windows Update**" button on "**System Properties**" window.


System Properties
System Restore
Automatic Updates
Remote
General
Computer Name
Hardware
Advanced
Device Manager
The Device Manager lists all the hardware devices installed on your computer. Use the Device Manager to change the properties of any device.
Device Manager
Drivers
Driver Signing lets you make sure that installed drivers are compatible with Windows. Windows Update lets you set up how Windows connects to Windows Update for drivers.
Driver Signing
Windows Update
Hardware Profiles
Hardware profiles provide a way for you to set up and store different hardware configurations.
Hardware Profiles
OK
Cancel
Apply

Note:

The "**Windows Update**" setting supports **Windows XP SP2** only. If the system is not Windows XP SP2, please skip step 4 to 6.

5. Select "**Never search Windows Update for drivers**" and click "**OK**".


Connect to Windows Update
When you connect a new device, how do you want Windows to connect to the Windows Update Web site to search for a matching driver?
If my device needs a driver, go to Windows Update without asking me
Ask me to search Windows Update every time I connect a new device
Never search Windows Update for drivers
Using Windows Update requires a connection to the Internet.
Read our privacy policy
OK
Cancel

6. Click "**OK**" on "**System Properties**" window to close it.

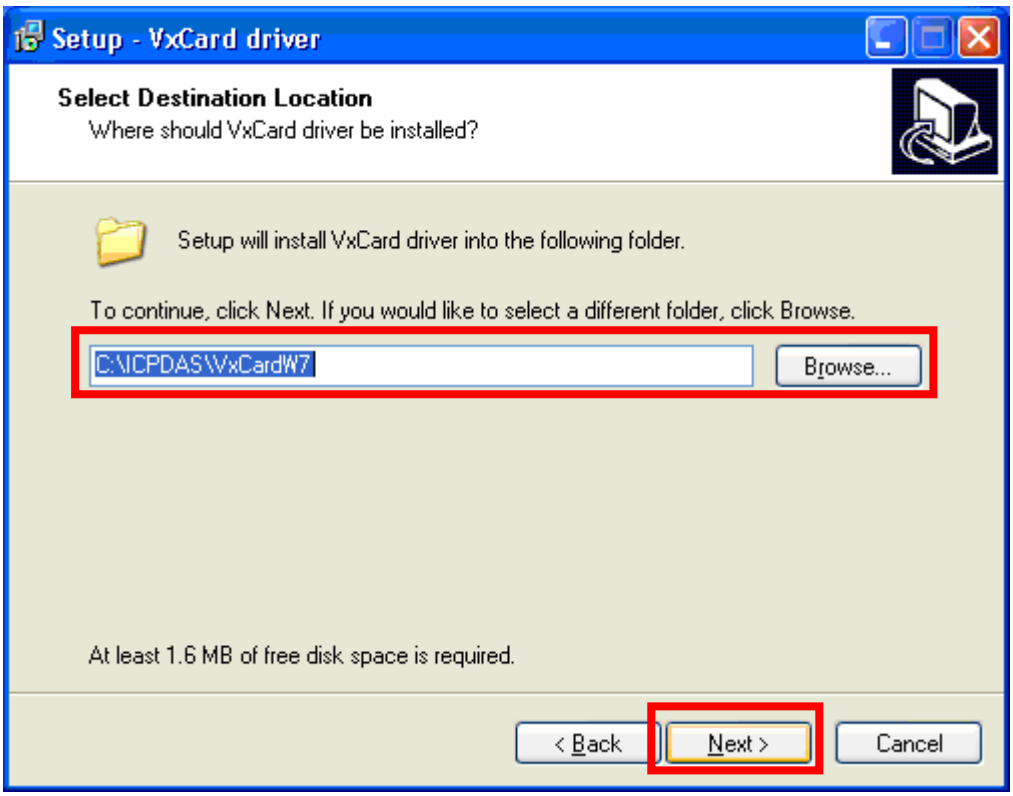
3.3.2 Driver Installation

Note:
It's recommended to install the software first, and then the hardware. This reduces the configuration procedures.
Refer to "**Quick Start**" for getting the location of setup program on CD.

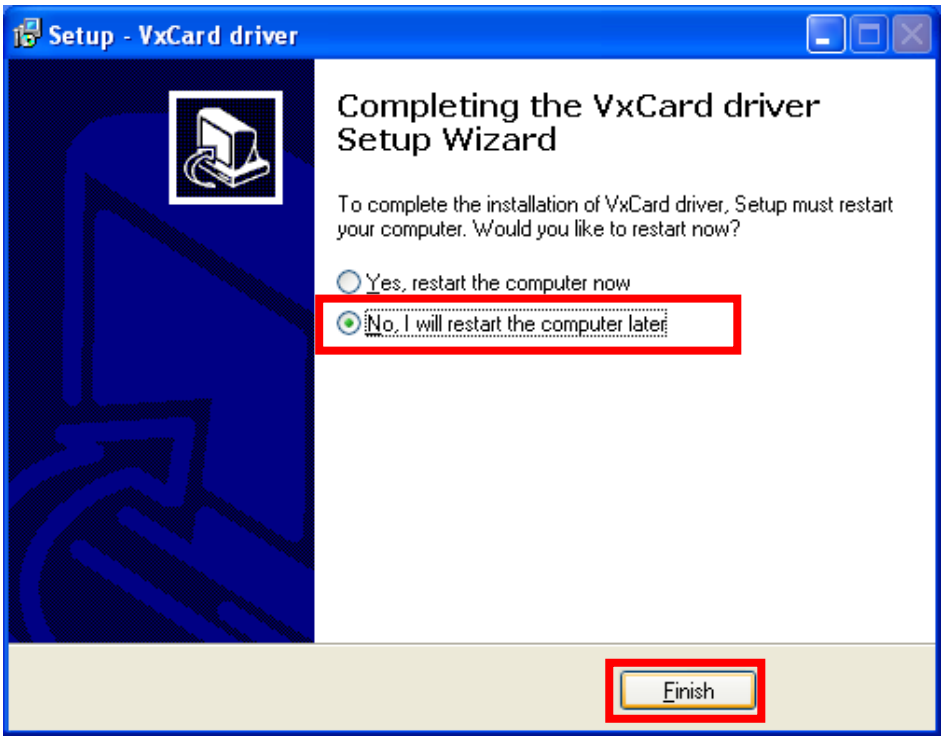
1. Launch the **VxCard_W7_v2.08.00.exe** to install the driver and register the related information onto the system.

2. Click "**Next>**" button to start installation.

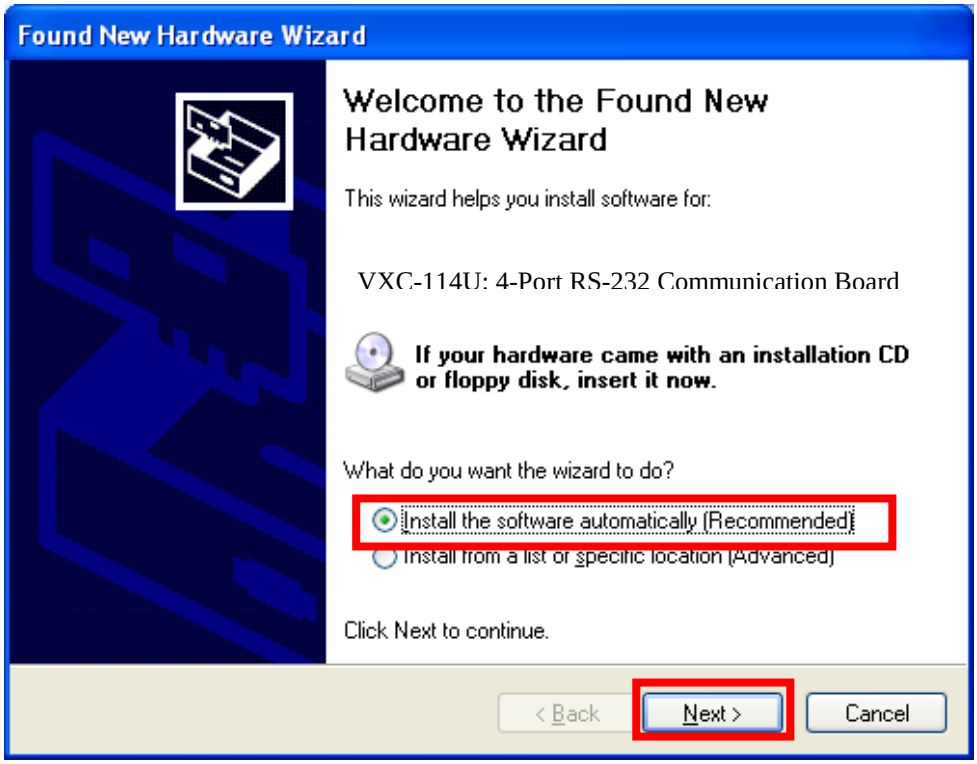
3. Select a folder where setup will install files, and click "**Next>**" button.


Setup - VxCard driver
Select Destination Location
Where should VxCard driver be installed?
Setup will install VxCard driver into the following folder.
To continue, click Next. If you would like to select a different folder, click Browse.
C:\ICPDAS\VxCardW7
Browse...
At least 1.6 MB of free disk space is required.
< Back
Next >
Cancel

4. Select "**No, I will restart the computer later**" and click "**Finish**" button.


Setup - VxCard driver
Completing the VxCard driver Setup Wizard
To complete the installation of VxCard driver, Setup must restart your computer. Would you like to restart now?
Yes, restart the computer now
No, I will restart the computer later
Finish

5. Turn off the computer and install the VXC/VEX card into the PC.
6. Power on the computer and continue to finish the Plug and Play procedures.
7. Select "**Install the software automatically [Recommended]**" and Click "**Next>**" button.


Found New Hardware Wizard
Welcome to the Found New Hardware Wizard
This wizard helps you install software for:
VXC-114U: 4-Port RS-232 Communication Board
If your hardware came with an installation CD or floppy disk, insert it now.
What do you want the wizard to do?
Install the software automatically (Recommended)
Install from a list or specific location (Advanced)
Click Next to continue.
< Back
Next >
Cancel

8. Click "**Finish**" button.

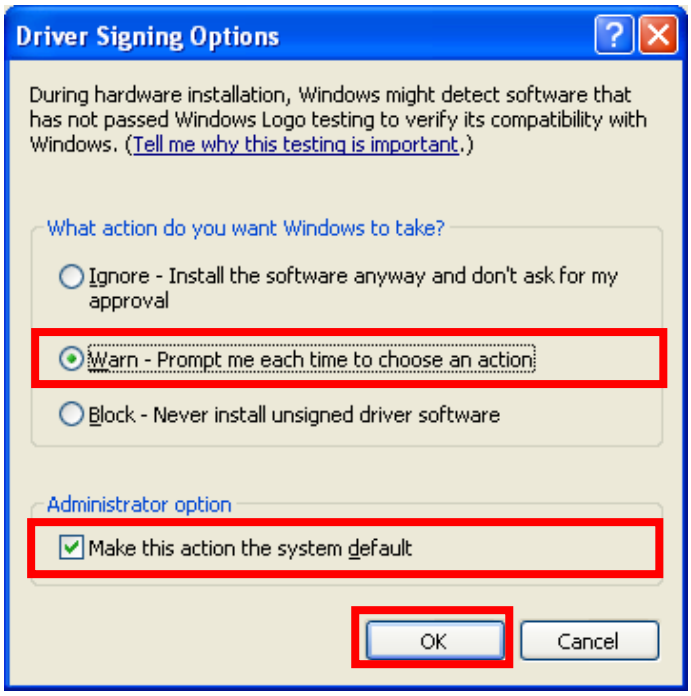
9. Windows pops up "**Found New Hardware Wizard**" dialog box again. Please repeat the step 8 to 9 to finish the installation for all COM ports.

3.3.3 Restore the Driver Signing Setting

1. Select "**Start / Settings / Control Panel**" and then "**System**".

2. Select the "**Hardware**" page on "**System Properties**" window and click "**Driver Signing**".

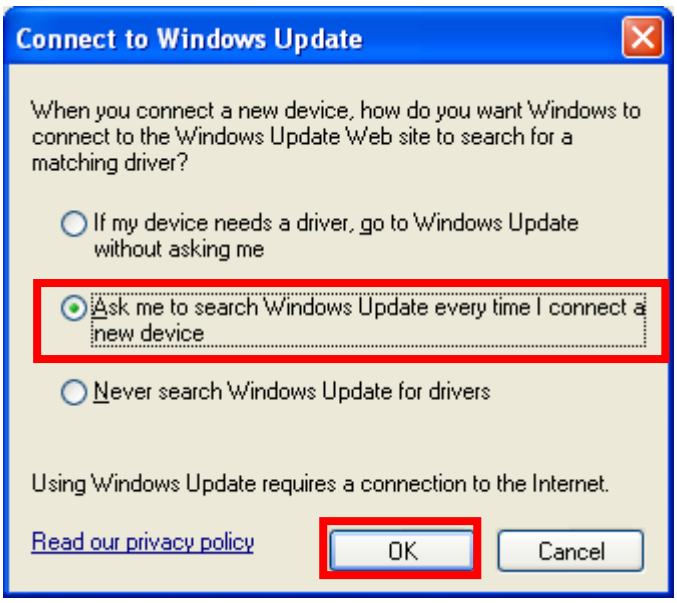
3. Select "**Warn – Prompt me each time to choose an action**", check "**Make this action the system default**" and then click "**OK**" to close the "**Driver Signing Options**" window.


Driver Signing Options
During hardware installation, Windows might detect software that has not passed Windows Logo testing to verify its compatibility with Windows. (Tell me why this testing is important.)
What action do you want Windows to take?
Ignore - Install the software anyway and don't ask for my approval
Warn - Prompt me each time to choose an action
Block - Never install unsigned driver software
Administrator option
Make this action the system default
OK
Cancel

4. Click the "**Windows Update**" button on "**System Properties**" window.

> **Note:**
> The "**Windows Update**" setting supports **Windows XP SP2** only. If the system is not Windows XP SP2, please skip step 4 to 6.

5. Select "**Ask me to search Windows Update every time I connect a new device**" and click "**OK**" button.


Connect to Windows Update
When you connect a new device, how do you want Windows to connect to the Windows Update Web site to search for a matching driver?
If my device needs a driver, go to Windows Update without asking me
Ask me to search Windows Update every time I connect a new device
Never search Windows Update for drivers
Using Windows Update requires a connection to the Internet.
Read our privacy policy
OK
Cancel

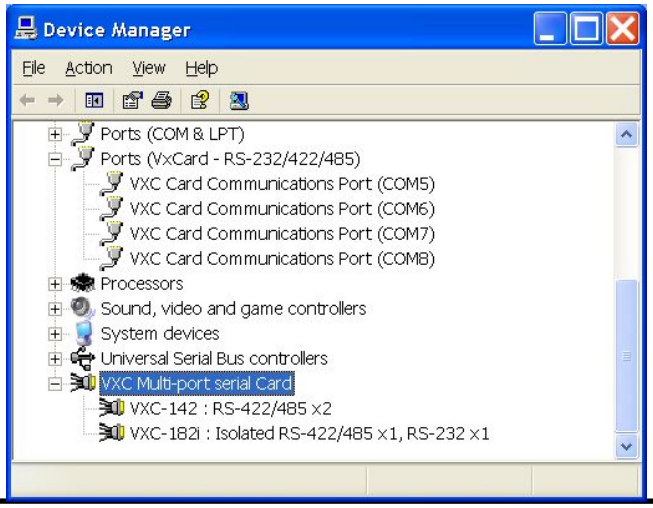
6. Click "**OK**" button to close the "**System Properties**" window.

3.3.4 Verification

To verify the installation, please complete the following steps:

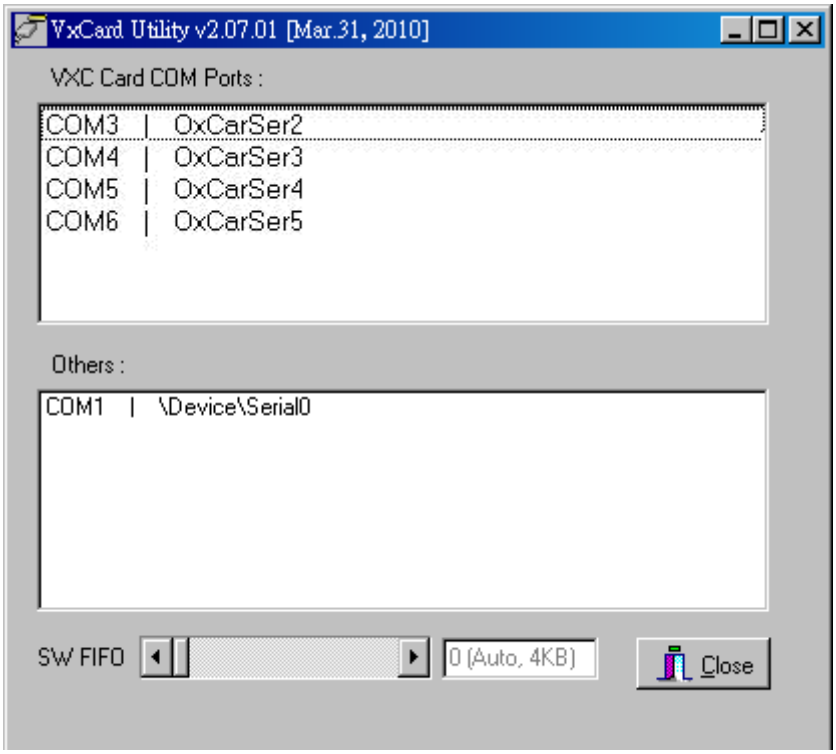
1. Select "**Start / Settings / Control Panel**" and double-click the "**System**" icon.
2. Click the "**Hardware**" tab and then click the "**Device Manager**" button.

The VXC/VEX Card is listed under the "**VXC Multi-port serial Card**" class, and each Communications Port is listed under the "**Ports (VxCard – RS-232/422/485)**" class.


Device Manager
File Action View Help
Ports (COM & LPT)
Ports (VxCard - RS-232/422/485)
VXC Card Communications Port (COM5)
VXC Card Communications Port (COM6)
VXC Card Communications Port (COM7)
VXC Card Communications Port (COM8)
Processors
Sound, video and game controllers
System devices
Universal Serial Bus controllers
VXC Multi-port serial Card
VXC-142 : RS-422/485 x2
VXC-182i : Isolated RS-422/485 x1, RS-232 x1

3.3.5 Configuration

If need, users can change the input buffer size (default is 4 KB for each port, up to 128 KB) by setting the “SW FIFO” scroll-bar on the VxCard Utility. The utility’s short cut is placed on the desktop after driver installed.



To change the COM port mappings (see **Section 2.2 COM Port Mappings and Board ID**), users should restart the driver by rebooting the computer, or re-install the “**VXC/VEX Card**” hardware in the “**Device Manager**” by un-install card and then scan new hardware.

3.3.6 Uninstallation

Before removing the card from your computer, it’s recommended to uninstall the device from the ”**Device Manager**”. This removes unused hardware information from the database (registry) of Windows.

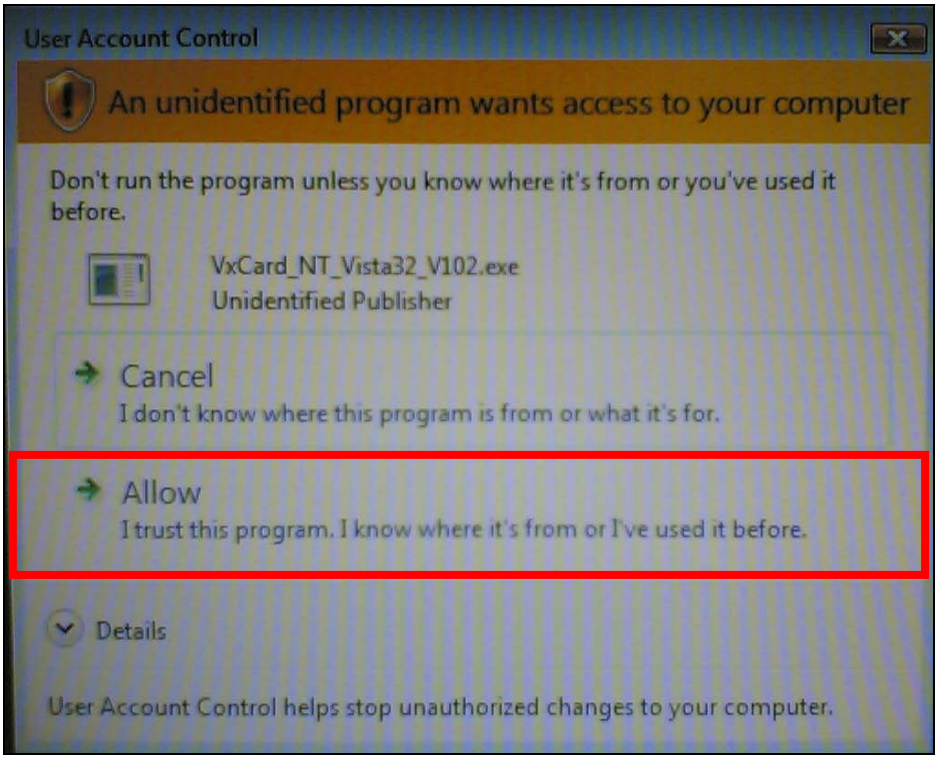
3.4 Windows Vista

3.4.1 Driver Installation

Note:
It's recommended to install the software first, and then the hardware. This reduces the configuration procedures.
Refer to "**Quick Start Guide**" for getting the location of setup program on CD.

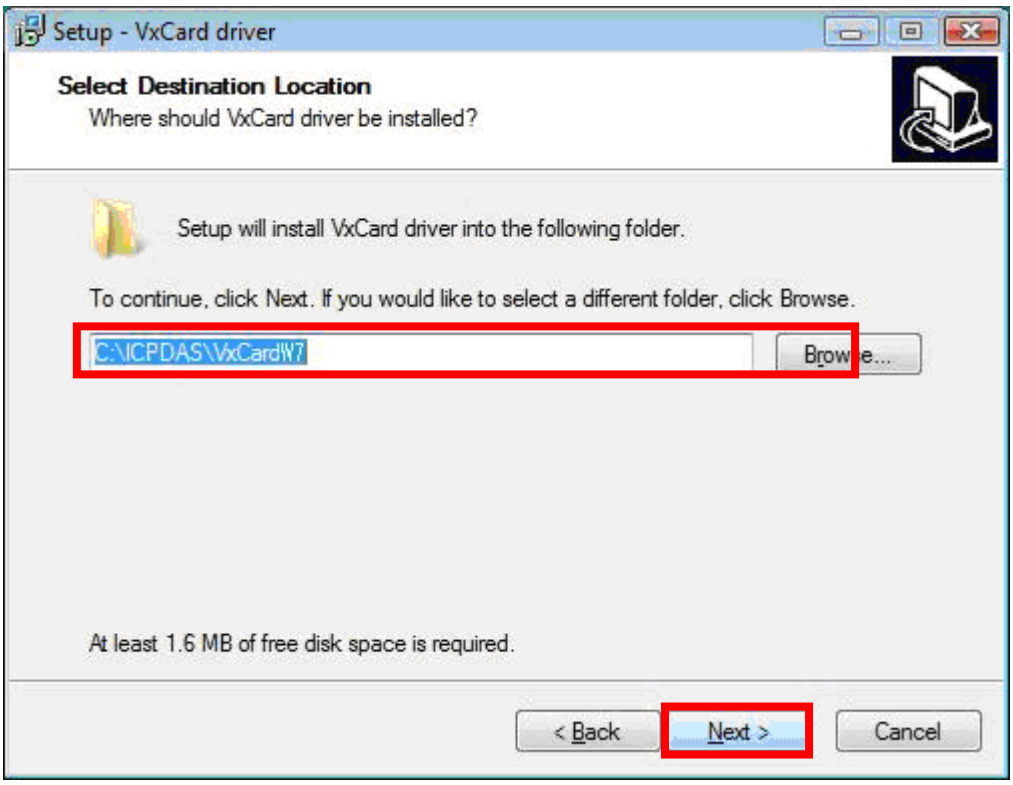
1. Launch the **VxCard_W7_v2.08.00.exe** to install the driver and register the related information onto the system.

2. Click "**Allow, I trust this program. I know where it's from or I've used it before**" on the "**User Account Control**" window.


User Account Control
An unidentified program wants access to your computer
Don't run the program unless you know where it's from or you've used it before.
VxCard_NT_Vista32_V102.exe
Unidentified Publisher
Cancel
I don't know where this program is from or what it's for.
Allow
I trust this program. I know where it's from or I've used it before.
Details
User Account Control helps stop unauthorized changes to your computer.

3. Click "**Next>**" button to start installation.

4. Select folder where setup will install files, and click "**Next>**" button.


Setup - VxCard driver
Select Destination Location
Where should VxCard driver be installed?
Setup will install VxCard driver into the following folder.
To continue, click Next. If you would like to select a different folder, click Browse.
C:\ICPDAS\VxCardW7
Browse...
At least 1.6 MB of free disk space is required.
< Back
Next >
Cancel

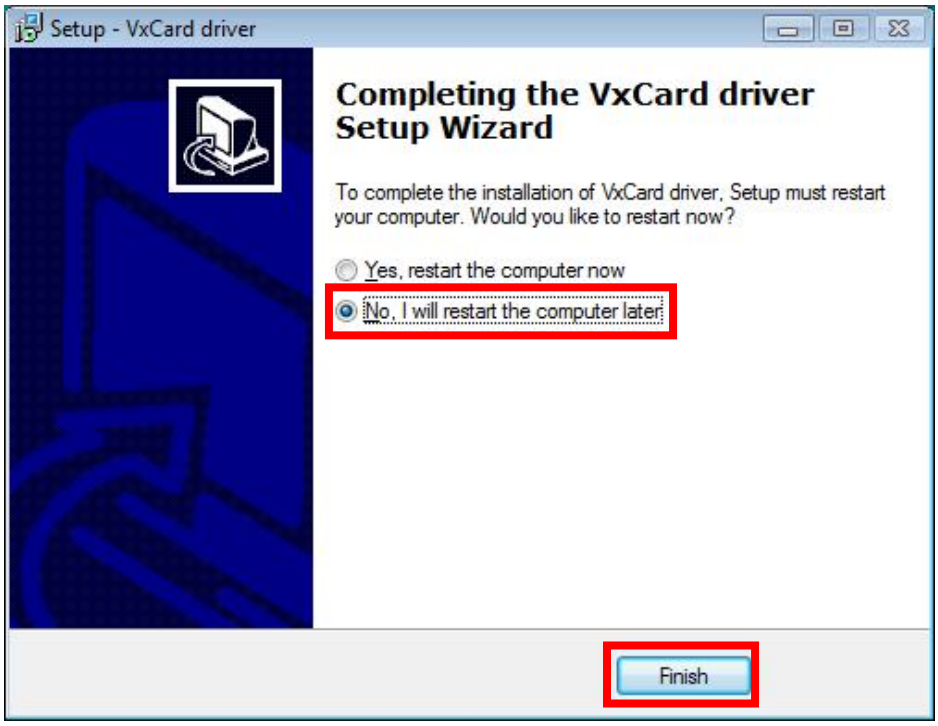
5. Click "**Install this driver software anyway**".

Windows Security
Windows can't verify the publisher of this driver software
Don't install this driver software
You should check your manufacturer's website for updated driver software for your device.
Install this driver software anyway
Only install driver software obtained from your manufacturer's website or disc. Unsigned software from other sources may harm your computer or steal information.
See details

Note:

The prompt will repeat for several times. Please click "**(Install this driver software anyway)**" for all these prompts.

6. Select "**No, I will restart the computer later**" and click "**Finish**" button.


Setup - VxCard driver
Completing the VxCard driver Setup Wizard
To complete the installation of VxCard driver, Setup must restart your computer. Would you like to restart now?
Yes, restart the computer now
No, I will restart the computer later
Finish

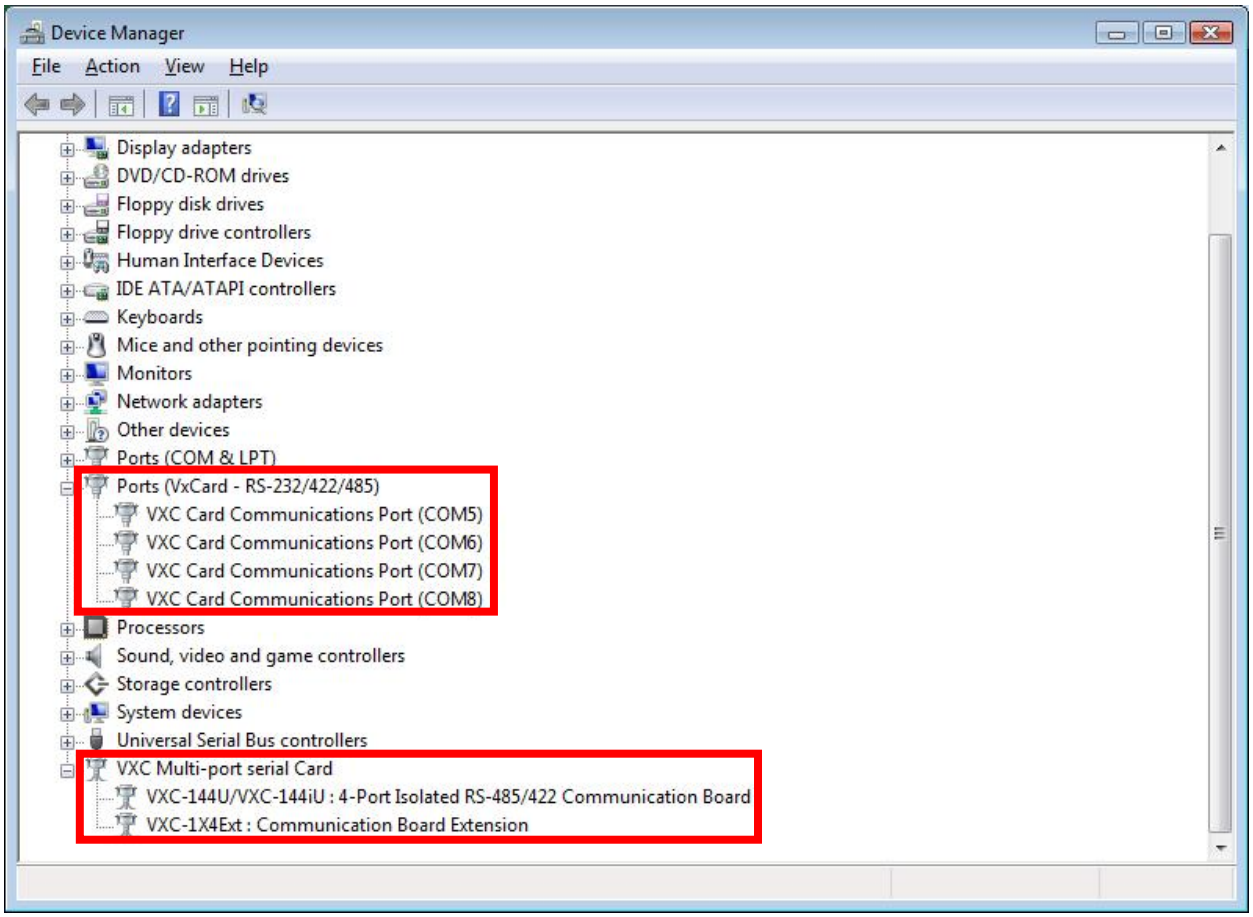
7. Turn off the computer and install the VXC/VEX card into the PC.
8. Power on the computer and system will find the new card and make it work automatically.

3.4.2 Verification

To verify the installation, please complete the following steps:

1. Select "**Start / Settings / Control Panel**" and double-click the "**System**" icon.
2. Click the "**Hardware**" tab and then click the "**Device Manager**" button.

The VXC/VEX Card is listed under the "**VXC Multi-port serial Card**" class, and each Communications Port is listed under the "**Ports (VxCard – RS-232/422/485)**" class.

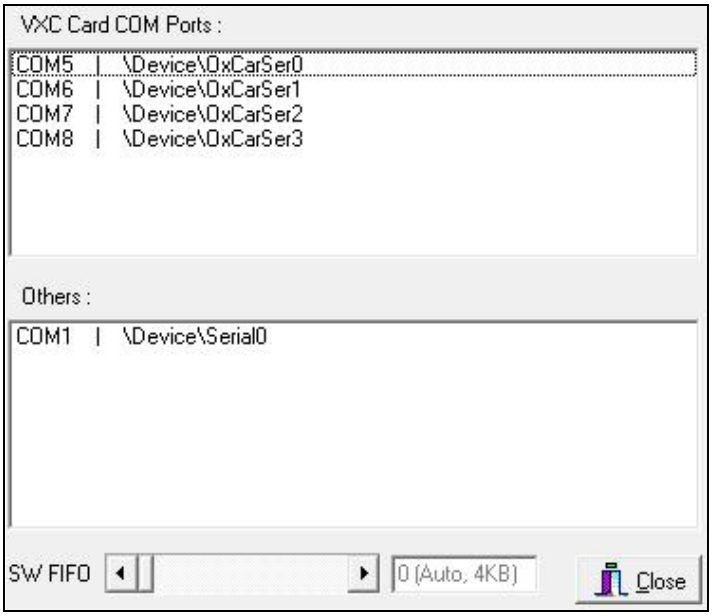


3.4.3 Configuration

If needed, users can change the input buffer size (default is 4 KB for each port, up to 128 KB) by setting the "SW FIFO" scroll-bar on the VxCard Utility. The utility's short cut is placed on the desktop after driver installed.

1. Click “**VxCard Utility.exe**”.

2. The VXC/VEX Card Utility shows all COM ports that existing in the system.



To change the COM port mappings (see **Section 2.2 COM Port Mappings and Board ID**), users should restart the driver by rebooting the computer, or re-install the “**VXC/VEX Card**” hardware in the “**Device Manager**” by un-install card and then scan new hardware.

3.4.4 Uninstallation

Before removing the card from your computer, it’s recommended to uninstall the device from the ”**Device Manager**”. This removes unused hardware information from the database (registry) of Windows.

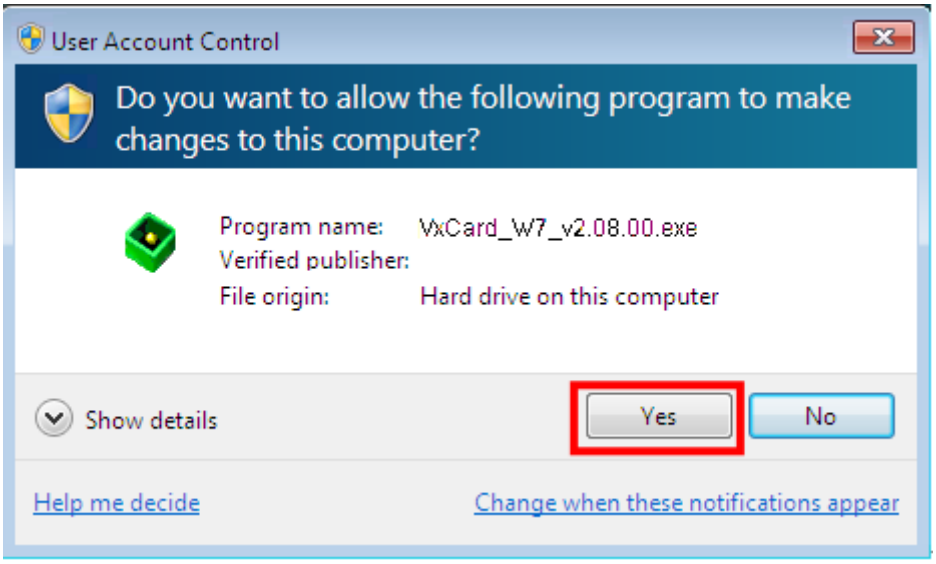
3.5 Windows 7

3.5.1 Driver Installation

Note:
It's recommended to install the software first, and then the hardware. This reduces the configuration procedures.
Refer to "**Quick Start Guide**" for getting the location of setup program on CD.

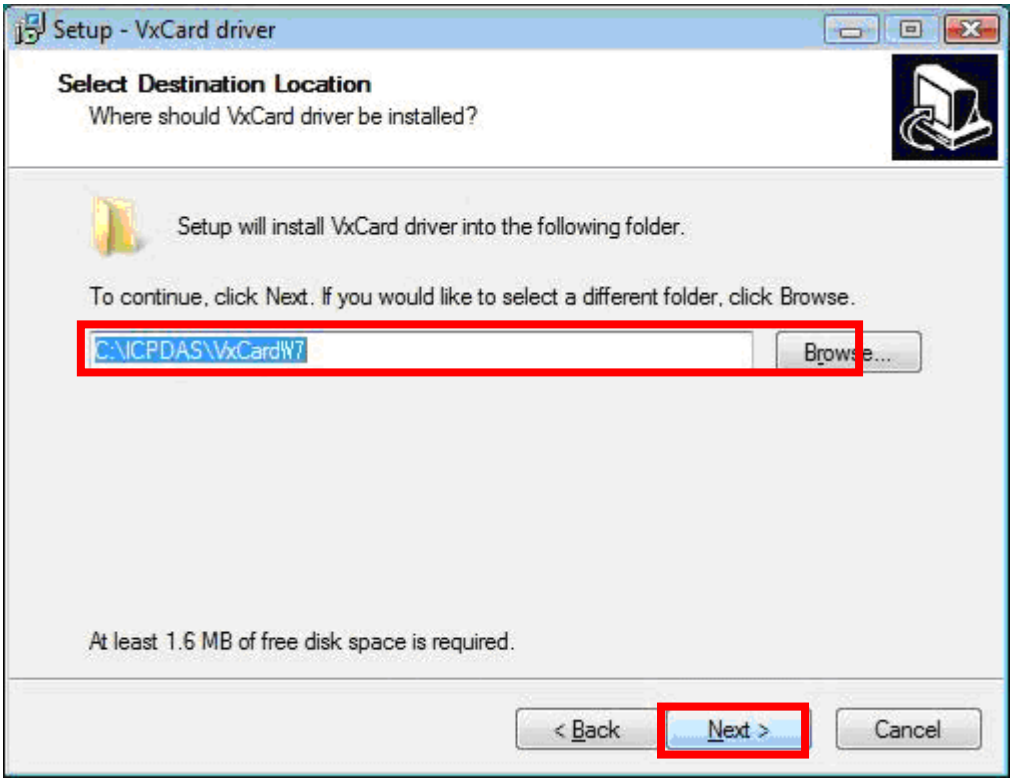
1. Launch the **VxCard_W7_v2.08.00.exe** to install the driver and register the related information onto the system.

2. Click "Yes" button.

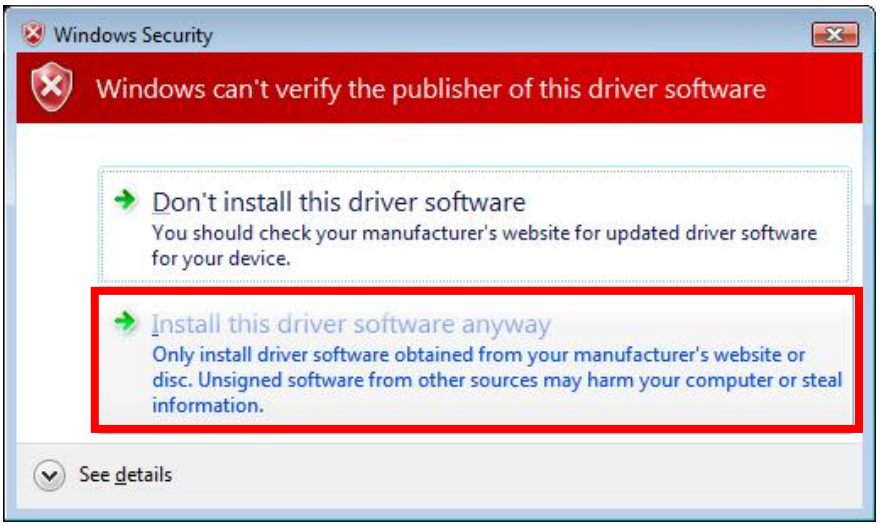

User Account Control
Do you want to allow the following program to make changes to this computer?
Program name: VxCard_W7_v2.08.00.exe
Verified publisher:
File origin: Hard drive on this computer
Show details
Yes
No
Help me decide
Change when these notifications appear

3. Click "**Next>**" button to start installation.

4. Select folder where setup will install files, and click "**Next>**" button.


Setup - VxCard driver
Select Destination Location
Where should VxCard driver be installed?
Setup will install VxCard driver into the following folder.
To continue, click Next. If you would like to select a different folder, click Browse.
C:\ICPDAS\VxCardW7
Browse...
At least 1.6 MB of free disk space is required.
< Back
Next >
Cancel

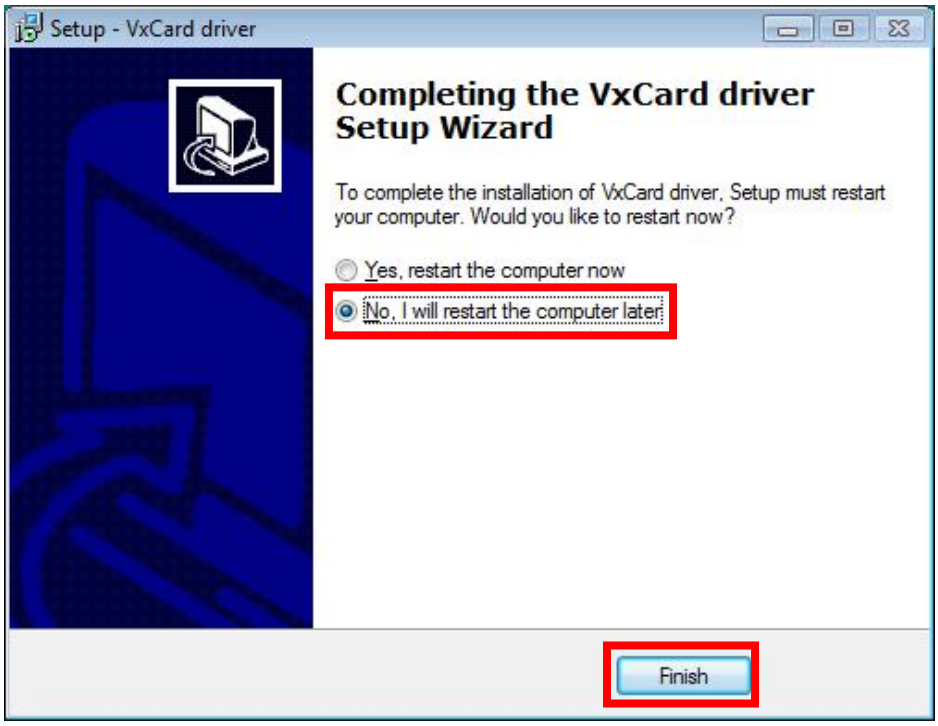
5. Click "**Install this driver software anyway**".


Windows Security
Windows can't verify the publisher of this driver software
Don't install this driver software
You should check your manufacturer's website for updated driver software for your device.
Install this driver software anyway
Only install driver software obtained from your manufacturer's website or disc. Unsigned software from other sources may harm your computer or steal information.
See details

Note:

The prompt will repeat for several times. Please click "**(Install this driver software anyway)**" for all these prompts.

6. Select "**No, I will restart the computer later**" and click "**Finish**" button.


Setup - VxCard driver
Completing the VxCard driver Setup Wizard
To complete the installation of VxCard driver, Setup must restart your computer. Would you like to restart now?
Yes, restart the computer now
No, I will restart the computer later
Finish

7. Turn off the computer and install the VXC/VEX card into the PC.

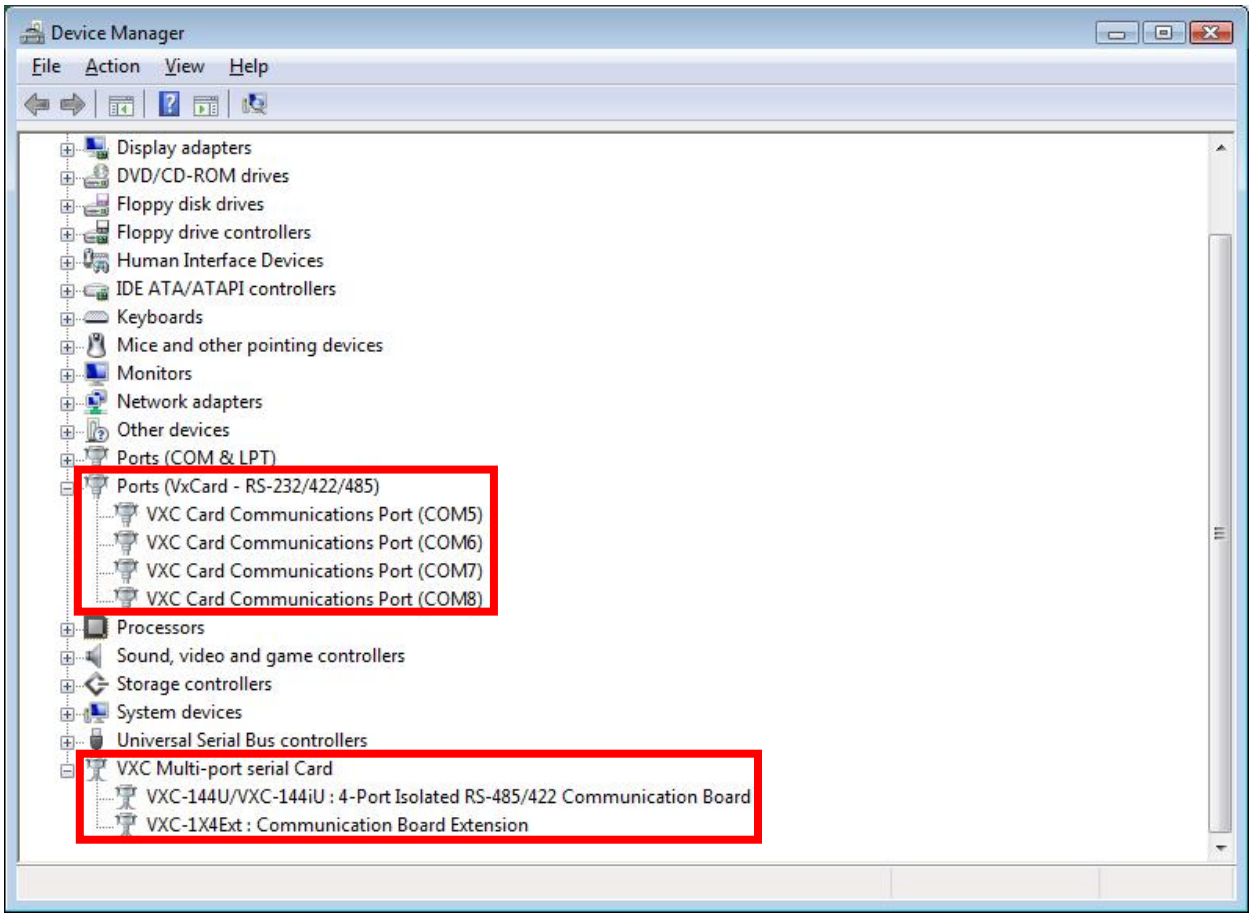
Power on the computer and system will find the new card and make it work automatically.

3.5.2 Verification

To verify the installation, please complete the following steps:

3. Select "**Start / Settings / Control Panel**" and double-click the "**System**" icon.
4. Click the "**Hardware**" tab and then click the "**Device Manager**" button.

The VXC/VEX Card is listed under the "**VXC Multi-port serial Card**" class, and each Communications Port is listed under the "**Ports (VxCard – RS-232/422/485)**" class.

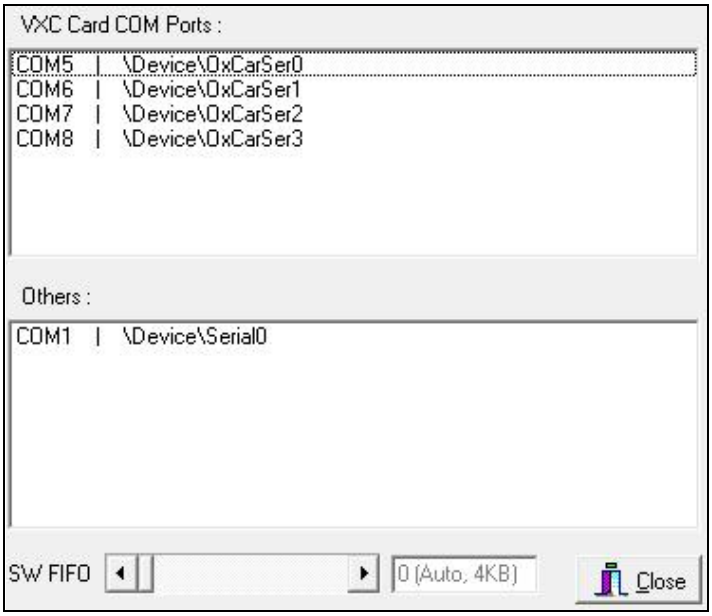


3.5.3 Configuration

If needed, users can change the input buffer size (default is 4 KB for each port, up to 128 KB) by setting the "SW FIFO" scroll-bar on the VxCard Utility. The utility's short cut is placed on the desktop or start menu after driver installed.

3. Click “**VxCard Utility.exe**”

4. The VXC/VEX Card Utility shows all COM ports that existing in the system.



To change the COM port mappings (see **Section 2.2 COM Port Mappings and Board ID**), users should restart the driver by rebooting the computer, or re-install the “**VXC/VEX Card**” hardware in the “**Device Manager**” by un-install card and then scan new hardware.

3.5.4 Uninstallation

Before removing the card from your computer, it’s recommended to uninstall the device from the ”**Device Manager**”. This removes unused hardware information from the database (registry) of Windows.

3.6 Linux

This section describes VXC/VEX Card Linux driver's features and how to compile and install into a general Linux system (Linux kernel 2.4.X or 2.6.X). The VXC/VEX Card Linux driver is modified from Linux kernel source and supports most of popular PC-based Linux distributions.

3.6.1 Driver Features

- Device file.
- Dynamic device allocation.
- Dynamic major number.
- One major number for multiple devices.
- Use the GNU configure and build system.

3.6.2 Installation

Please refer to the following steps to complete it.

1. Download or copy the **IxCOM** package to a directory that you have access to.

2. Extract the package. For example, the package's file name is "**ixcom-0.8.1.tar.gz**" and its path related to your current working directory is../pkg, then the extraction command would be
   #tar -zxvf ../pkg/ixcom-0.8.1.tar.gz

   An ixcom-0.8.1 directory is created after extraction.

3. For convenient access, it is a good idea to put a symbol-link on it.
   #ln -s ixcom-0.8.1 ixcom

4. Change to the **ixcom** working directory you just made, type
   #./configure to create proper Makefiles.

5. Once the configuring has done successfully, type "**make**" to build all.

> **Note:** If you like to install files to system directory, the make install will do it for you. However, install files to system directory is not necessary for further operation. You will need the root privilege for that.

Script "**./ixcom.inst**" loads modules automatically. Script "**./ixcom.remove**" removes the loaded modules. The root privilege is required when installing or removing these kernel modules.

3.6.3 Access to VXC/VEX Serial Port

Script "**ixcom.inst**" will establish unused device major number dynamically and create correspond device node for access VXC/VEX serial port.

```
# ./ixcom.inst
IxCOM Installer 0.5.0
Check kernel version... 2.6
Use proc-file /proc/icpdas/ixcom
Load module ixcom
```

Use "**dmesg**" command to inspect the driver output message.

```
dmesg
……
……
ICPDAS VXC multi-serial card Serial driver version ixcom-0.8.1 (2007-08-21)
Found ICPDAS VXC-114U series board(BusNo=0,DevNo=20)
PCI: Found IRQ 11 for device 0000:00:14.0
PCI: Sharing IRQ 11 with 0000:00:07.2
PCI: Sharing IRQ 11 with 0000:00:14.1
ttySV0 at port cc00 (irq = 11) is a 16C950/954
ttySV1 at port d000 (irq = 11) is a 16C950/954
ttySV2 at port d400 (irq = 11) is a 16C950/954
ttySV3 at port d800 (irq = 11) is a 16C950/954
```

The script “**ixcom.inst**” had loaded module into kernel and find a VXC/VEX card that have four serial port, ttySV0, ttySV1, ttySV2 and ttySV3.

The “**ixcom.inst**” script will use major number 254 to create correspond device on the /dev.

```
# ls -la /dev/ttySV?
crw-rw-rw-   1 root  root   254,  64 Jul 14 10:13 /dev/ttySV0
crw-rw-rw-   1 root  root   254,  65 Jul 14 10:13 /dev/ttySV1
crw-rw-rw-   1 root  root   254,  66 Jul 14 10:13 /dev/ttySV2
crw-rw-rw-   1 root  root   254,  67 Jul 14 10:13 /dev/ttySV3
crw-rw-rw-   1 root  root   254,  68 Jul 14 10:13 /dev/ttySV4
crw-rw-rw-   1 root  root   254,  69 Jul 14 10:13 /dev/ttySV5
crw-rw-rw-   1 root  root   254,  70 Jul 14 10:13 /dev/ttySV6
crw-rw-rw-   1 root  root   254,  71 Jul 14 10:13 /dev/ttySV7
crw-rw-rw-   1 root  root   254,  72 Jul 14 10:13 /dev/ttySV8
crw-rw-rw-   1 root  root   254,  73 Jul 14 10:13 /dev/ttySV9
```

To remove VXC/VEX driver from system use script “**./ixcom.remove**” to removes the loaded modules.

4. Programming Reference

4.1 PCI Hardware IDs

Card	Vendor ID	Device ID	Sub-Vendor ID	Sub-Device ID	Version
VXC-114U VXC-114iAU	0x1415	0x9504	0x1441	0x0090	Rev1.1
	0x1415	0x9501	0x1441	0x0091	Rev4.0
VXC-144U VXC-144iU	0x1415	0x9504	0x1440	0x0090	Rev3.1
	0x1415	0x9501	0x1440	0x0091	Rev4.0
VXC-112(A)U VXC-112iAU	0x1415	0x9501	0x1441	0x0080	Rev1.3
	0x1415	0x9505	0x1441	0x0080	Rev4.0
VXC-142(A)U VXC-142i(A)U	0x1415	0x9501	0x1440	0x0080	Rev1.2
	0x1415	0x9505	0x1440	0x0080	Rev4.0
VXC-182i(A)U	0x1415	0x9501	0x1442	0x0080	Rev1.1
	0x1415	0x9505	0x1442	0x0080	Rev4.0
VEX-114(i)	0x1415	0xC20D	0x1441	0x0091	Rev1.0
VEX-144(i)	0x1415	0xC20D	0x1440	0x0091	Rev1.0

4.2 I/O Address Mapping

The I/O address of the VXC/VEX series card is automatically assigned by the main-board ROM BIOS. The universal version of VXC/VEX series cards using two PCI functions as followings:

Application:

VXC-112U, VXC-142U/142iU, VXC-182iU, VXC-114U/114iAU (Version after Rev1.2), VXC-144U (Version after Rev1.2), VXC-144iU (Version after Rev3.2)

Base Address Register	Function 0	Function 1
BAR0	**UARTs** (I/O Mapped)	Local Bus (I/O Mapped)
BAR1	**UARTs** (Memory Mapped)	Local Bus (Memory Mapped)
BAR2	Local Configuration Registers (I/O Mapped)	Reserved
BAR3	Local Configuration Registers (Memory Mapped)	Reserved
BAR4	Reserved	Reserved
BAR5	Reserved	Reserved

Application:

VXC-112(A)U/112iAU (Rev4.0), VXC-142AU/142iAU (Rev4.0), VXC-182iAU (Rev4.0)

Base Address Register	Function 0	Function 1
BAR0	**UART0** (I/O Mapped)	Local Bus (I/O Mapped)
BAR1	**UART1** (I/O Mapped)	Local Bus (Memory Mapped)
BAR2	Reserved	Reserved
BAR3	Reserved	Reserved
BAR4	Local Configuration Registers (I/O Mapped)	Reserved
BAR5	Local Configuration Registers (Memory Mapped)	Reserved

Note: Please contact us for more information about I/O Address Mapping.

Application:

VXC-114U (Rev1.1), VXC-144U (Rev1.1), VXC-144iU (Rev3.1)

Base Address Register	Function 0	Function 1
BAR0	**UART0** (I/O Mapped)	Local Bus (I/O Mapped)
BAR1	**UART1** (I/O Mapped)	Local Bus (Memory Mapped)
BAR2	**UART2** (I/O Mapped)	Reserved
BAR3	**UART3** (I/O Mapped)	Reserved
BAR4	Local Configuration Registers (I/O Mapped)	Reserved
BAR5	Local Configuration Registers (Memory Mapped)	Reserved

Note: Please contact us for more information about I/O Address Mapping.

Application:

VEX-114(i) (Rev1.0), VEX-144(i) (Rev1.0)

Base Address Register	Function 0	Function 1
BAR0	**GPIO** (Memory Mapped)	**UART** (Memory Mapped)
BAR1	All visible Modules and MSI-X	All visible Modules and MSI-X (Used for MSI-X)
BAR2	Reserved	All visible Modules and MSI-X (Used for EEPROM)
BAR3	Reserved	Reserved
BAR4	Reserved	Reserved
BAR5	Reserved	Reserved

Note: Please contact us for more information about I/O Address Mapping.

4.3 UART Register

Register Name	Address	R/W	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
THR [1]	000	W	Data to be transmitted							
RHR [1]	000	R	Data received							
IER [1,2] 650/950 Mode	001	R/W	CTS interrupt mask	RTS interrupt mask	Special Char. Detect	Sleep mode	Modem interrupt mask	Rx Stat interrupt mask	THRE interrupt mask	RxRDY interrupt mask
550/750 Mode			Unused		Alternate sleep mode					
FCR [3] 650 mode	010	W	RHR Trigger Level		THR Trigger Level		Tx Trigger Enable	Flush THR	Flush RHR	Enable FIFO
750 mode			RHR Trigger Level		FIFO Size	Unused				
950 mode			Unused							
ISR [3]	010	R	FIFOs enabled		Interrupt priority (Enhanced mode)		Interrupt priority (All modes)			Interrupt pending
LCR [4]	011	R/W	Divisor latch access	Tx break	Force parity	Odd / even parity	Parity enable	Number of stop bits	Data length	
MCR [3,4] 550/750 Mode	100	R/W	Unused		CTS & RTS Flow Control	Enable Internal Loop Back	OUT2 (Int En)	OUT1	RTS	DTR
650/950 Mode			Baud prescale	IrDA mode	XON-Any					
LSR [3,5] Normal	101	R	Data Error	Tx Empty	THR Empty	Rx Break	Framing Error	Parity Error	Overrun Error	RxRDY
9-bit data mode								9th Rx data bit		
MSR [3]	110	R	DCD	RI	DSR	CTS	Delta DCD	Trailing RI edge	Delta DSR	Delta CTS
SPR [3] Normal	111	R/W	Temporary data storage register and Indexed control register offset value bits							
9-bit data mode			Unused							9th Tx data bit
Additional Standard Registers – These registers require divisor latch access bit (LCR[7]) to be set to 1.										
DLL	000	R/W	Divisor latch bits [7:0] (Least significant byte)							
DLM	001	R/W	Divisor latch bits [15:8] (Most significant byte)							

4.4 Programmable Baud Rate

Baud Rates Using a 14.7456 MHz Crystal (Universal series cards)

DESIRED BAUD RATE	DIVISOR USED TO GENERATE 16× CLOCK	PERCENT (%) ERROR
50	18432	
75	12288	
110	8376	0.026
150	6144	
300	3072	
600	1536	
1200	768	
2400	384	
4800	192	
9600	96	
14400	64	
19200	48	
23040	40	
28800	32	
38400	24	
56000	16	2.86
57600	16	
115200	8	
184320	5	
230400	4	
307200	3	
460800	2	

Warning: The baud rates higher than 115,200 bps are not guaranteed to work.

Baud Rates Using a 62.5 MHz Crystal (PCI Express series cards)

DESIRED BAUD RATE	TCR Reg	CPR Bit(7:3)	DLM	DLL	PERCENT (%) ERROR
1200	0100	00100	0C	B6	0.037
2400	0100	00100	06	5B	0.037
4800	0100	00100	03	2D	0.099
9600	0100	00100	01	96	0.221
19200	0100	00100	00	CB	0.221
38400	0100	00100	00	66	-0.270
57600	0100	00100	00	44	-0.270
115200	0100	00100	00	22	-0.270
230400	0100	00100	00	11	-0.270
460800	0100	00001	00	22	-0.270
921600	0100	00001	00	11	-0.270
1843200	0100	00100	00	02	-0.270
3686400	0100	00100	00	01	-0.270

Warning: The baud rates higher than 115,200 bps are not guaranteed to work.

4.5. Customized Baud Rate

To generate baud rate 125,000 bps:

125,000 * 16 * 8 = 16,000,000 = 16 MHz crystal

So, when you use a 16 MHz crystal to replace the built-in 14.7 MHz crystal (for U versions VXC cards) and select the baud rate 115,200 bps in your software setting, the hardware will generate baud rate 125 kbps actually.

Note: External 14.7 MHz crystal can be customized to replace (for U versions VXC cards), but VEX cards (PCI Express) can't.

To generate baud rate 250,000 bps:

250,000 * 16 * 4 = 16,000,000 = 16 MHz crystal

(Baud rate * 16 x clock * Divisor = Crystal Clock Frequency)

Thus, when you use a 16 MHz crystal to replace the built-in 14.7 MHz crystal (for U versions VXC cards) and select the baud rate 230,400 bps in your software setting, the hardware will generate baud rate 250 kbps actually.

Note: The multi-port serial cards can have a special baud rate in OEM version. Please contact us for more information regarding the OEM products.

Warning: The baud rates higher than 115,200 bps are not guaranteed to work.